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GEOLOGICAL SURVEY

OF

ALABAMA.

From EUGENE ALLEN SMITH, PH. D., STATE GEOLOGIST.

REPORT

UPON THE

COOSA COAL FIELD

WITH SECTIONS,

BY

A. M. GIBSON, ASSISTANT GEOLOGIST.

MONTGOMERY, ALA.:
ROEMER PRINTING CO., PRINTERS AND BINDERS.
1895.

Alabama.

GEOLOGICAL SURVEY, 1873–

OF

ALABAMA.

With compliments of
Eugene A. Smith,
University of Alabama
Please acknowledge receipt.

I. D., STATE GEOLOGIST.

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UPON THE

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WITH SECTIONS,

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MONTGOMERY, ALA.:
ROEMER PRINTING CO., PRINTERS.
1895.

763

To His Excellency,

GOVERNOR WILLIAM C. OATES,

SIR:—I transmit herewith a Report upon the Coal Measures of the Coosa Field by A. M. Gibson, Assistant Geologist. The examinations of Mr. Gibson, though necessarily incomplete, show, I think, conclusively that the Coosa Field holds a much greater quantity of available coal of good quality, than has heretofore generally been thought to be the case. While it is the intention to continue these investigations by the Survey, it is yet much to be desired that this preliminary report shall have the effect of stimulating investigations by private parties and corporations who have personal interest in different parts of the field, for it is after all, upon these that we have to depend for the great mass of details, from which only a full knowledge of this field can be acquired.

I have the honor to be, Sir,

Your obedient servant,

EUGENE A. SMITH,

State Geologist.

University of Alabama,
April 15, 1895.

Reclass. MLP. 11-30-37

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LETTER OF TRANSMITTAL.

DR. E. A. SMITH, STATE GEOLOGIST:

Sir—I herewith transmit my report on the Coosa Coal Field, containing the results of its examination during the last two years.

In the investigation of the geological structure, and mineral contents of this extensive field, much pioneer work had to be done. The development of its coal had been attempted at only a few places. Some of these had been abandoned, and at the others no aid could be obtained from previous examinations, or surveys of mines.

With the progress of the investigations the importance of the field has gradually developed. It is known to be, in many places, rich in coal, and generally of a very fine quality for fuel, and the production of coke.

In consequence of the want of development, over most of the field, the report lacks the completeness that is now expected in a final geological report—but it is hoped, that it discloses enough to awaken public interest in the development of this very important, but as yet unappreciated coal field.

Very respectfully yours &c.,
A. M. GIBSON.

EAST LAKE, ALA., November 28, 1894.

GEOLOGICAL SURVEY OF ALABAMA.
EUGENE ALLEN SMITH. STATE GEOLOGIST.

SECTIONS TO ILLUSTRATE
REPORT
on the
COOSA COAL FIELD,
by
A. M. GIBSON,
ASSISTANT GEOLOGIST.

Scale of Miles.
0 1 2

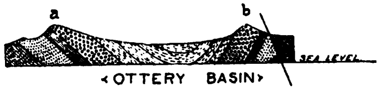
1895.

DRAWN BY
H. F. Wilson, Jr., C.E.,
Birmingham, Ala

REFERENCES.

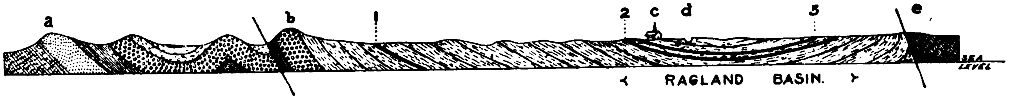
- ░ *1st & 4th Conglomerates.*
- ▒ *2nd Conglomerate.*
- ■ *Black Slate.*
- ▨ *Sandstones, Shales, &c*
- — *Coal Seams.*

1.



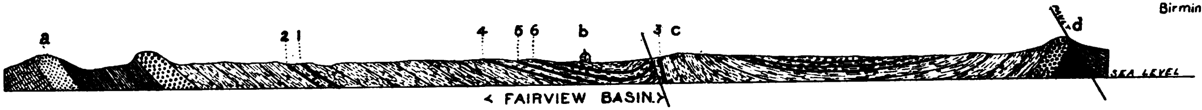
CALHOUN COUNTY.
ONE MILE EAST OF COOSA RIVER.
a *Shoal Creek Mtn.* b. *Boundary Fault.*

2.



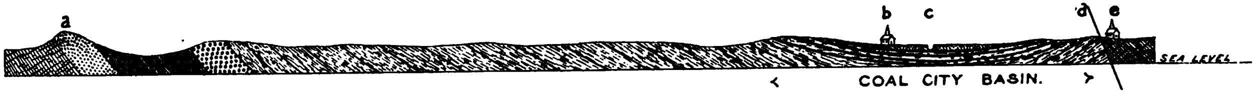
RAGLAND SECTION, THROUGH TOWN OF RAGLAND.
a. *Shoal Creek Mtn.* b. *Backbone Ridge.* c. *Ragland.* d. *Trout Creek.* e. *Boundary Fault.*
1. *Coal Seam, 3'-8".* 2. *Ragland Seam, 3'-0".* 3. *Peacock Seam.*

3.



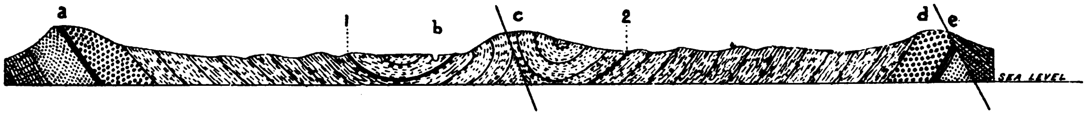
FAIRVIEW SECTION, THROUGH FAIRVIEW STATION.
a. *Shoal Creek Mtn.* b. *Fairview Station.* c. *Vertical Measures.* d. *Boundary Fault.*
1. *Carson Seam.* 2. *Hawkins Seam.* 3. *Vertical Seam.* 4. *Chapman Seam, 3'-6".* 5. *Fairview Seam. 4'-0".* 6. *Higginbotham Seam, 2'-6".*

4.



COAL CITY SECTION.
a. *Rock Pine Mtn.* b. *Coal City.* c. *Broken Arrow Creek, in 4th Conglomerate.* d. *Boundary Fault.* e. *Broken Arrow.*

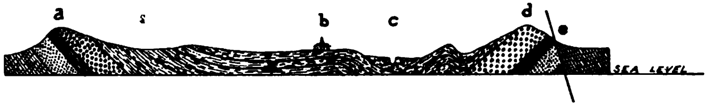
5.



CANEFIELD TUNNEL SECTION.

a. *Bald Rock.* b. *Cane Creek.* c. *Vertical Measures.* d. *Wolf Creek Mtn.* e. *Boundary Fault.*
1. *Caracker Seam, 4'-0".* 2. *Coal Seam, 4'-0".*

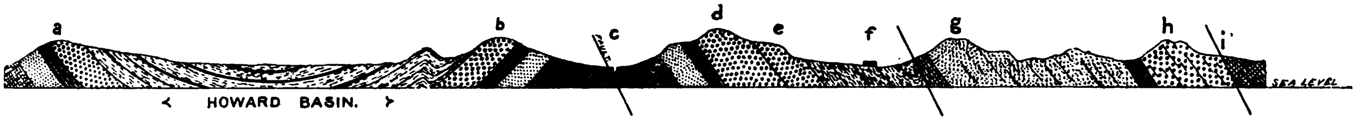
6.



DUNAVANT SECTION, ALONG LINE OF C. & W. R.R.

a. *Big Oak Mtn.* b *Dunavant Station.* c. *Shoal Creek.* d. *Coosa Mtn.* e. *Boundary Fault.*

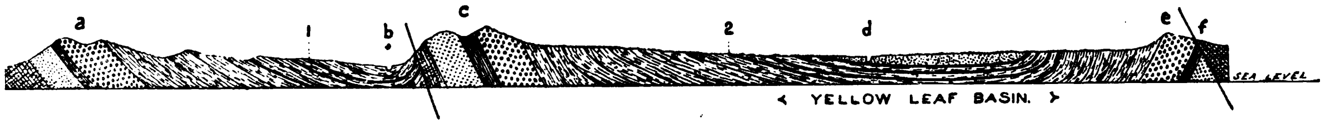
7.



HOWARD BASIN SECTION.

a. *Big Oak Mtn.* b. *Coosa Mtn.* c. *Bear Creek.* d. *Signal Mtn.* e. *Laurel Point.* f. *Penitentiary.* g *Oak Mtn.* h. *Pine Mtn.*
i. *Boundary Fault.*

8.



PEAVINE SECTION.

a. *Big Oak Mtn.* b. *Peavine Creek.* c. *Double Mtn.* d. *Yellow Leaf Creek, in 4th Conglomerate.* e. *Salster Mtn.* f. *Boundary Fault.*
1. *Cunningham Seam, 5'-6".* 2. *Martin Seam, 12'-10".*

THE COOSA COAL FIELD.

INTRODUCTORY.

This Coal Field was named after the river into which its surplus waters flow, and with which it is so intimately connected by its drainage and topography. Its name is eminently proper also, because of its connection with the Coosa Valley. It is really a part of, and embraced in the great Coosa Valley Fold, a part of which called the Cahaba Valley, makes its northwest boundary, and separates it from the Cahaba Coal Field; while on its southeast side is the Coosa Valley proper, or rather that prong of this great Valley, in which the Coosa river flows below the "Ten Islands." These two Valley areas, like two broad arms of this great fold, encompass this Coal Field.

Most of this Coal Field lies in Shelby and St. Clair counties, with a small portion extending about a mile and a half into Calhoun, East of the Coosa River at Ten Islands. It extends entirely through St. Clair County, a distance of 34 miles, and 24 miles into Shelby County, making the whole length of the field approximate 60 miles.

Its breadth is very irregular, and hence its area has been variously estimated by different writers. These estimates have varied from 252 to 470 square miles. After a careful examination of the whole field it is considered that 345 square miles is a close approximation to its productive area. In "Berney's Hand-Book of Alabama" the portions of this field lying in St. Clair and Shelby Counties, are estimated at 350 square miles, which for a popular publication was a very close estimate;

but the portion of it lying in Calhoun, which had not been critically examined, was somewhat exaggerated, and stated to be 30 square miles. It is not surprising that this coal area should have been presumed to extend away beyond the Coosa River. It is a broken Country from the River eastward to the end of the Colvin Mountains; in this region there is much iron ore, mostly the Sub-carboniferous brown ore, with some Clinton strata and red hematite, and abundance of limestone. The formations lying just below the Carboniferous extend far out into Calhoun County, and are very prominent. The abundance of iron ore and other materals in this region rendered the possession of bituminous coal also, exceedingly desirable. Then beyond the limits of the Coal Field, for many miles, black slates make the country—slates to the unprofessional mind always suggestive of "Stone Coal," from the similarity of color; and in which many prospect holes have been sunk in vain, and much time wasted in the hopeless search, and with no other result then an occasional false report of a coal find.

The productive Coal Measures in Calhoun County lie in sections 18, and 19, of T. 14, R. 6 East and in S. 24, of T. 14, R. 5 East. This is a well defined little coal basin, but so far as known no effort has yet been made to find coal here, where it probably exists—it almost certainly exists here, but apparently too deeply covered up to have any outcrop. It is to be regretted that the productive coal area, in Calhoun County, has not been clearly pointed out at an earlier period, and the efforts there to find coal directed to the only locality where they could, and probably would have been successful.

This coal field is very narrow in proportion to its length, averaging less than six miles wide, and bordered on both sides by valleys of elevation, with high marginal rims or bordering mountains; it is hence necessarily a mountainous and rugged area. But in addition to its marginal mountains, it is traversed by many prominent mountains, and high ridges, which complicate the topography, and give most of the field a very rugged outline. As these mountains constitute the salient points, and frame work of the region, a brief description of them and their relations to the field must first be given.

CHAPTER I.

BORDERS OF THE FIELD.

Near the Ottery P. O. on the road leading from Talladega to Greensport, in section 19, T. 14, of R. 6 East, is a prominent mountain rising 400 feet above the plain, and apparently standing alone. On ascending its steep side by a long slant, it is seen that it is wholly composed of conglomerate rocks. Some of the rocks make very excellent building stone; it was from this vicinity that the fine-pebbled, well cemented rocks used in building the *Janey Furnace* were obtained. This was a furnace of large dimensions erected during the late war, in S. 20, T. 14, of R. 6 East—built in the side of a ridge of brown iron ore, but never completed, a monument of wasted effort.

On reaching the top of the mountain it is seen to be semicircular in form, a nearly level, and greatly depressed area, enclosed by a high ridge of conglomerate rocks, all dipping steeply inwards, or towards the depressed centre. This conglomerate is the base rock of the productive coal measures. This is the extreme northeastern boundary of the Coosa Coal Field, which here encloses a small but well defined coal area known as the *Ottery basin*. It is a ↄ shaped basin with a regular curve, and the inward dip on each side about equal, and ranging from 40 to 50 degrees. Standing on the curve there is seen to the northeast another curve of high points and peaks of hard sub-conglomerate strata, and still farther off distinct elevations of the Sub-carboniferous, and brown ore ridges to the end of Colvin Mountain, as it curves around on the outer circle towards the Ohatchee Hills; while still farther away on the same course *Mount Weisner* stands alone in the blue distance. All the surroundings make it very evident that this upper end of the Coosa Coal Field is a part of a long narrow synclinal, beginning at the marginal curve, and deepening toward the southwest. Deepening, and widening, and taking on additional strata toward the southwest. On the northwest side of the curve the strike or trend of the mountain rim is south 60 degrees west, and on the southeast side said it is south 40 degrees west. This trend or strike of the bordering rim continues for a mile or two southwest of the Coosa, or until the width of the field has attained the average of five to six miles; afterwards the strike of both sides of the field is about the same, and generally southwest.

The upper edge of the field at the Coosa River is at Rock Island, between locks 1 and 2, thence to the Shoal Creek Mountain, about the N. W. Corner of S. 24, T. 14, of R. 5 East.

Near this point the conglomerate has been almost wholly disintegrated, and presents great beds and masses of very pure silica, of white sand and liberated pebbels; materials for making glass, and fire-brick and rubble-work are here in great abundance, and would be of much industrial value were they accessible, or in a place where they could be utilized. In about a mile from the Coosa River the Shoal Mountain attains nearly its usual elevation, and is wholly composed of First or Lower Conglomerate rock, dipping about 40 degrees to the southeast. It is a very rough and rocky mountain, covered with great spaces and masses of the naked rock. About half a mile to the southeast of it are high rough and rugged ridges of the *Second Conglomerate*, almost as high, and quite as rocky as Shoal Creek Mountain, which bear the names of "Rocky Ridge," "Pine Mountain," &c. They are much broken up by gaps, and bear several different names, but are always separated from the Shoal Creek Mountain by a smooth narrow valley. This little valley, or hollow gives some evidence of coal, and shows by its breadth the thickness of the inter-conglomerate measures in this region.

Near the head of Shoal Creek the bordering mountain takes the name of "Back Bone Mountain" which it bears to "Elbow Gap" in S. 13, T. 16, R. 2 East.

Back Bone Mountain, like Shoal Creek Mountain, is mainly composed of First or Lower Conglomerate rocks which appear to be increasing in volume towards the southwest, and the trend of the mountain is now in that direction, or 45 degrees west of south.

At the southwest end of Backbone Mountain is *Elbow Gap*, through which the public road from Coal City, Broken Arrow, Eden, &c., crosses towards Branchville, Trussville, &c. From this point to Carr's Gap the two conglomerates are very close together, they make in fact but one massive mountain of pudding stone. There is so much rock exposed, on the whole face of the mountain that it is very appropriately named "*Bald Rock*." Its top is over 1600 feet above sea level, the highest mountain in this section of the State.

At *Carr's Gap* this formidable mountain was broken through, probably by a transverse fault, and Kelley's Creek, which rises away to the northeast in Cahaba Valley, found here a passage out through it into the Coosa Coalfield, and thence southward across it, on its course to the Coosa River. Here too the Georgia Pacific R. R. Co. found a very practicable route through this gap without materially deviating from their course.

Southwest from Carr's Gap the two conglomerates continue in the same close relation, and are always embraced in the valley rim, which now takes the name of "*Big Oak Mountain*," which it bears to the lower, or southwest end of the field. In this long stretch the mountain is very uniform in height, and almost entirely free from gaps. Except where the "*Columbus and Western R. R.*" passes through it there is no place found for twenty miles where its structure could be seen. At the cut and tunnel made for this road the structure is very plainly shown, and it may be reasonably inferred that the same conditions obtain all the way from Carr's Gap to the end of the mountain near Pelham. On the valley side and top of the mountain is the *First or Lower Conglomerate,* and near the inside, or southeastern foot of the mountain is the *Second Conglomerate*, with sometimes a small depression between them. The space between the two conglomerates is about two hundred feet, wholly occupied by dark, or black clay slates, and only one small seam of coal, irregular, from one to three inches thick, near the top of the slates, or at the base of the Second Conglomerate rocks, was found.

Near Pelham this mountain curves to the south, or merges into another uplift trending nearly north and south. Whatever the dynamic cause, the fact is patent that a north and south elevation cuts off or deflects all the ridges having a southwest trend, in the Coosa Coal Field, and all of the Coal Measures also. In this abrupt southwest ending of this coal field it differs very materially from the Warrior and Cahaba fields. In both of these, their southwest ends are covered up by newer strata, which gradually thicken as the Coal Measures descend in that direction; it is hence as yet unknown how far the Coal Measures extend, or where is their true southwestern boundary. But the Coosa Coal Field is terminated by mountainous elevations running north and south, beginning near Pelham and extending south to Siluria, thence nearly east or somewhat northeast till they join on to or connect with *Salster Mountain.*

Perhaps it would be nearer strict geological accuracy to say that the Coosa Field was terminated at its southwestern end by a southward deflection of the Cahaba Valley, which for most of its length separates this field from the Cahaba Coal Field. The "Dry Creek," "Lolley," and "Montevallo" Basins of the Cahaba Field, would have fallen within the limits of the Coosa Field but for the change in the direction of the Cahaba Valley uplift below Helena. It is interesting to note that the Interior fault of the Cahaba Field, as depicted on Squire's Map, is a prolongation of the original course of the Cahaba Valley uplift.

The southern boundary of the Coosa Coal Field is along the *Salter Mountain*, and *Burket Mountain* to its southeast end; thence to the N. E. corner of Tp. 20 on the Meridian of Huntsville. From the corner of T. 20 the line of boundary is nearly northeast to the top of a ridge South of Pine *Mountain* called the "*Divide.*" This Ridge is about a mile from Pine Mountain, and like it trends northeast and southwest. It continues this course to near the southwest end of the ridge which rises up near Sterretts, called the "*Potato Hill*," and thence along its southeastern foot to its upper end at Sterretts, on the C. & W R. R.

The region around Sterretts presents evidence of great disturbance, and much strata out of their normal position. At the southwest end of the town is a high sharp topped elevation called "*The Potato Hill*," which rises up steeply from the plain to the height of 425 feet at the end next to Sterretts, and gradually declines toward the southwest end, which sinks beneath the surface about three miles from Sterretts, and nearly opposite the northeast end of *Pine Mountain*. Near the middle of this strangely shaped Hill, on its western side, a ridge branches off from it, and tending about northwest, joins on to a mountain called *Oak Mountain*, which extends several miles io the southwest, running near to, and parallel with *Pine Mountain*.

The "*Potato Hill*" is wholly composed of Second Conglomerate rock. The country is comparatively level to the south, east, and northeast. The strata are highly inclined, and much contorted in this level area, and older than the included mountain. The line of the great fault which bounds, and cuts off the Coosa Coal Field on its southeast side, evidently runs along the southeast side of the *Potato Hill*, and curves northward around its upper end. Subcarboniferous strata are either vertical or highly inclined to the southeast, while the *Potato Hill* strata are partly horizental, and partly dipping northwest, with southwest declination.

From Sterretts northeastward to the Coosa River, the exact position of the boundary fault is often obscure. There is no regularity in the part of the vertical section of the coal measures exposed at the edge of the fault. In a few places only, the conglomerates come to the surface, at or near the southeast side of the field; generally it is members lying higher up that are there exposed. About six miles northeast of Vandiver, where Kelley's Creek breaks through this edge of the field, there is a very prominent exposure of both the First and Second Conglomerates. They are separated by only 50 feet of very dark clay slate, about the same as at Carr's Gap on the opposite side of the field. On the southwest side of the Creek these conglomerates dip 89 degrees N. W.—while on the southeast side of it they dip 80 degrees S. E. One or other of these conglomerates comes to the surface near the town of Eden, also opposite the town of Fairview, and to a very small extent southeast of Ragland. At the latter place the fault has very greatly diminished, and is mostly at the very edge of the Coal Measures: only a very little conglomerate rock comes to the surface; this is followed by several hundred feet of Sub-conglomerate measures, and they by 200 or 300 feet of *Carboniferous Limestone*—this by a large amount of Fort Payne Chert, and that by Trenton Limestone. These formations extend northeast towards the Coosa River, and near to it the only evidence seen of the fault, was the vertical conglomerate rocks near the mouth of Bridge Creek, one mile south of Lock No. 2. From this point back to the high Trenton ridge ending at Lock No. 3, the whole space has been so denuded, and silted up again, that none of the bordering formations are visible, and they may not come to the surface, though there is ample splace to contain them with their usual inclination of strata.

CHAPTER II.

THE TOPOGRAPHY OF THE FIELD.

A little south of the Ten Islands of the Coosa, and just west of the lower end of the largest one, probably in S. 19, T. 14, R. 6 East, stands Lock No. 3 of the Coosa River improvements. It stands on historic ground; near by was the Indian Village of "*Littafutchee*," which was attacked by General Jackson's advance guard under *Col. Dyer*, and destroyed in Oct., 1812. The site of the Lock was the rallying ground of the Creeks on that occasion, and when routed, the broken remnant crossed the arm of the Coosa on the shoal where the dam now stands, and took refuge among the dense canes on the large Island.

A little south of *Lock three* is the site of old *Fort Strother*, where Jackson made his headquarters, and base of operations, from Oct., 1812, to the middle of January, 1813. It was here that, owing to a failure of his commissary stores to reach them from Tennessee, his army suffered terribly for lack of food, and the General himself was reduced to a diet of acorns. A few unmarked and nameless graves are all that now remain of old Fort Strother!

From this picturesque and historic spot, there rises up to the southwest a high and massive ridge of Trenton Limestone, and Fort Payne Chert. These become separated farther to the southwest, forming two high and massive ridges. At the end of the high Trenton ridge, about three miles southwest of old Fort Strother, is a magnificent limestone spring, and near by an immense shell heap, or Indian *Kitchen Midden*. This shell heap marks the site of an ancient Indian Village, and the enormous accumulation of shells, chiefly muscle (unios), periwinkles, and land snails, (*helix nemoralis*) show rather the destitution, and precarious means of preserving life, to which the Indians were often reduced, than their choice, and usual food supply. Had these mollusks been their choice, and dependence for food generally, we may be sure that the sites of their villages would have been near the shoals where they could be most readily obtained, and not as here, opposite a long stretch of deep water, in which they could not be procured, and to which they had to be conveyed to toil and labor, to which the Indians were always averse. The high ridges of Trenton limestone, and Fort Payne Chert above referred to, are flanked on the northwest side by a ridge of Subcarboniferous chert, and Carboniferous or *Mountain limestone*. This is the farthest to the southeast that this rock has been seen in large volume. It shows here along the face of the ridge for about a mile, and extends with nearly horizontal strata out on the level ground one hundred yards, or more, and shows much naked rock in Blue Spring branch. What its thickness may be here, is largely a matter of conjecture as it does not present a face, or profile that could be measured. Enough of it was seen to make it certain that it is over a hundred feet thick, and it may be two or three times as much. Its quality so far as seen is very good, carrying apparently from 95% to 98% carbonate of lime. All of it that was seen would make a good furnace flux.

The Ragland District and Bordering Mountains.—North and northeastward from this limestone ridge the country is level, or gently undulating, showing the effects of denudation, which has brought this section of the coal field, from the Coosa River to the mouth of Trout Creek, nearly to the level of the Coosa Valley.

About one mile west and northwest of the town of Ragland, the country becomes rough and broken. Where

Trout Creek has cut its way through the ridges, between Ragland and Fairview, the topography is imposing in its wild ruggedness. And it is rendered more imposing still by the railroad cuts, and trestles of the E. & W. R. R. of Ala., which crosses the creek seven times in less than a mile, while the deep cuts expose the contortions of the plicated strata.

On the north side of Trout Creek and near the north line S. 11, T. 15, R. 4 East, there rises up gradually toward the northeast a high sharp-backed ridge of Second Conglomerate rock. The trend of this ridge is north 40 degrees east, dip southeast 70 to 80 degrees. Its height above Trout Creek is 300 feet. This ridge is very narrow, just broad enough on top for a public road, known as the "Backbone Road," leading from Fairview to Greensport.

This ridge is an uplift of the Second Conglomerate, its trend brings it gradually nearer to the *"Shoal Creek Mountain,"* with which it coalesces before reaching the Coosa River. It is very evident that a fault runs close along the northwest side of this ridge. It is not an anticlinal but a lift fault, this being the heaved side; the steep southeast dip of 70 to 80 degrees does not extend far in that direction, and probably there is a section of vertical strata on its northwest side, which though not seen along its base, becomes very prominent at its lower end near Trout Creek. This vertical section embraces a seam of coal, which near Trout Creek, in S. E. ¼ of S. 2, T. 15, of R. 4 East, is merely a vast seam of carbonaceous matter, of sand and coal 15 feet thick. The trend of these vertical strata is S. 40 degrees W., which is uniformly held to the edge of the coal field near Broken Arrow Creek. The fact that this vertical section carries a good seam of coal three or four feet thick in the Fairview district, and the further fact that it does not make a ridge or prominent mark on the surface, give it a deep geological, rather than topographical interest.

Northwest of the ridge last described are three ridges, also of the Second Conglomerate rock lying close together, and parallel with the Shoal Creek Mountain which borders the field, and from a quarter to a half mile distant from it.

These ridges are nearly as high as Shoal Creek Mountain, and almost wholly composed of naked conglomerate rock, most of which dips steeply to the southeast, but some of it to the northwest, while some is vertical. It would seem that in this part of the field there was an unusual degree of wrinklings of strata, and that the measures here are unusually thin, having the Second Conglomerate very near the surface. This condition of things obtains mainly in the northwestern part of the Ragland district, and the region north and northeast of head of Trout Creek.

The Fairview District presents very different topographical features. The wrinklings of the strata near the northwestern border does not exist; and on the southeastern side of the field the highest land is along the marginal fault, which hence becomes very prominent and easily traced, The field through this district is trough shaped, and shows a great thickening of the measures, and an increase in the number of the coal seams.

The Coal City District presents features similar to the Fairview district, except that the measures here assume a distinct basin form, and are thicker. The *Upper or Fourth Conglomerate* is here largely developed, and in connection with it are three or four fine seams of coal. It makes the top member of the coal measures in this field, if not also in the Cahaba and Warrior Coal Fields. This is the same rock that is so prominent in part of the Blount Mountain Coal Field, and classed there as the *Fourth Conglomerate*. It is still more prominent here, approximating 500 feet in thickness. On the southeast side of Coal City the marginal fault is very plainly seen in the top of a low ridge near the old town of Broken Arrow, called "No Business Ridge." This ridge becomes high and prominent towards the southwest, but is gradually deflected away from the Coal Measures. Opposite the town of Eden it is over a mile in a direct line from the edge of the coal field, and is wholly composed of Silurian (Trenton and Clinton) strata.

In the *Black Ankle* region which lies southwest of the Coal City basin, the only topopraphical feature to be noticed is a flat, or gently undulating area without any distinct marginal ridges, and with generally horizontal strata, or dipping just enough around the edges, toward a common center, to give it the basin form. This region gives no evidence of disturbance from uplift or lateral pressure; it has just the form that would arise from shrinkage or subsidence of the basin itself; a form produced by internal, not external causes. We have here an ideal of a *peat moss*, or *peat bog*, in which the vegetable matter grew, and decayed, and formed humus, and peat, and ultimately coal seams, successively, as each bed or layer of peat was sunk beneath the surface, and covered with sedimentary matter. It presents the process of coal formation on a small scale, in a limited area. It is a small coal field within a coal field, a basin within a more extensive coal bearing formation, which by some means escaped the strain which disturbed all the surrounding region and plicated its strata.

Southwest of the Black Ankle region the interior of the field becomes elevated, and much broken by many high ridges trending generally southwest. The centre ridge and the most prominent is called "Wolf Pen Ridge." The Georgia Pacific R. R. after passing Eden runs up Canefield Creek nearly to its head, and passes through the ridge by a tunnel, called on some maps "Canefield Tunnel." This ridge is composed wholly of Coal Measure rocks, and mainly of the blue micaceous rocks, which belong near the surface in this part of the field. The strata in this ridge, as seen at the tunnel, are very highly inclined, and present the appearance of having been forced up by pressure from both sides.

This structure is probably due to the existence of a thrust fault in the midst of the vertical measures, the faulting being similar to that shown in the Fairview section, except that the strata here on both sides of the fault, are more nearly vertical especially at and near the surface, below which they appear to flatten down rapidly.

On the southeast side of the tunnel a cut is made through one of the foot hills, or subsidiary ridges, which shows the curve of the strata almost as plainly as it is shown at the tunnel. At the top of the ridge the strata are almost vertical, but at the depth of 30 feet they have curved back to 70 degrees to the southeast.

As elsewhere remarked it is a very common thing to find the strata having a greater dip at the surface than at any considerable depth below it. This arises, in part at least, from the fact that the surface is *freest to move*, and therefore *most readily displaced* by the forces to which it may be subjected. In this case the forces concerned are chiefly gravity and lateral pressure.

This ridge loses its peculiar characteristics of structure as it gradually curves toward the south. It joins on to the southeast edge, or rim of the coal field to the east of Kelley's Creek, and there terminates. Throughout its course it has crossed more than two-thirds of the field, its course being south of southwest generally, and almost due south at its termination.

Coosa Mountain.—Near the mouth of the *Shoal Creek* of Shelby county, or near where it empties into Kelley's Creek, a ridge rises up from the level of the creek bottom, that demands special notice. This ridge rapidly attains a high elevation and is called there the *Shoal Creek Mountain.* As Bear creek runs on its opposite side, it is also called "*Bear Creek Mountain,*" but its most common name is the *Coosa Mountain.* Its course is first for a few miles nearly west, then west by 25 degrees south, to the point where the Columbus and Western R. R. passes through it; it thence curves southward having a general trend of south 20 degrees west to south 35 degrees west. This persistent and formidable mountain is a true uplift, composed in the main of Second Conglomerate rocks pushed far above their normal position. It is flanked by a fault on the east side, and on the west side by a small anticlinal. The principal portion of its strata dip north and northwest at an angle of 80 degrees, while near the town of Dunavant a half a mile northwest of the mountain, the strata showed a certain downward flexure of 75 degrees towards the southeast, and between this point and the mountain is a well marked anticlinal ridge. This arrangement of strata will be better understood by referring to the Dunavant section, (Fig. 6 of Plate.) And let it also be remembered that from *Big Oak Mountain* on the northwest side of the field, the strata all dip east and southeast, with gradually diminishing angle, and amounting to only 3 degrees up to the very edge of the great downward flexure between Dunavant Station and the tunnel above mentioned. This downward flexure was not seen at any other place, and may be local.

The anticlinal ridge on the northwest side of Coosa Mountain near its base is a very persistent feature, and was seen wherever the mountain was reached, from the tunnel to the gap of the mountain at Yellow Leaf Creek, opposite the Big Narrows. It is in some places very prominent, making a bold ridge, in others small and apparently unimportant, but generally increasing in magnitude toward the southwest, and seems finally to connect itself with Big Oak Mountain at the southwest, or lower end of the Howard Basin. Compared with the great volume of the adjacent Coosa Mountain it may have no more significance than a wrinkle in the strata, produced by the combined pressure, and upward flexure, of the yielding material.

The *Coosa Mountain* is the most prominent topographical feature in this part of the field. From where it rises near Dyke's or Duyke's Mill, on Kelley's Creek, to where it sinks near the north fork of Yellow Leaf, it is a bold, high, unbroken mountain, its summit 1000 to 1400 feet above sea level. It is composed mainly of the Second Conglomerate rocks, and hard black slates; these slates are in part the slates lying between the First and Second Conglomerates, which on the opposite side of the field we have seen to be two hundred feet thick, and perhaps in part the black slates belonging to the Subcarboniferous formation. The rocks and slates of this mountain as encountered in the tunnel are very hard and solid, showing the effects of great compression. On the surface only the conglomerate rocks are seen, but in the tunnel the hard slates were mainly encountered till near the centre of the mountain, which was found to be hard gray rock, probably the top members of the First Conglomerate, but so altered as to be of doubtful classification. All the strata of Coosa Mountain dip to the north and northwest, at an angle of 70 to 80 degrees.

Though this mountain must in part consist of First or Lower Conglomerate rocks, yet they seldom if ever appear on the surface. In crossing it at several places only Second Conglomerate rocks were seen, and opposite the highest part of the mountain, in Ss. 14 and 15, of T. 19, R. 1, West, in the deep hollow between it and the *Double Mountains*, the top of the dark slates which lie above the First Conglomerate are only partly exposed in the bed of the little creek; showing that the whole of the great First Conglomerate plate, and probably 200 feet of inter-conglomerate slates, are still beneath the bed of the deep hollow. Aneroid measure showed that this place is 190 feet lower than the Howard basin on the opposite side of the mountain.*

The great thickness of the conglomerate rocks in this region gives the most striking impress to its topography.

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* These slates have also been considered as of Sub-Carboniferous age, but they carry a small coal seam, 3 inches thick.

They are mountain makers in all parts of the field. These rocks which in the *Warrior Coal Field*, and the *Plateau Region* of the State, are usually reported to be 80 to 100 feet thick, have very rapidly thickened toward the south, and in the Coosa Coal Field are eight to ten times thicker than they are to the northwest along Jones' Valley. A conservative estimate would put their combined thickness here at 1000 feet. And to this may very properly be added 200 feet of dark slates lying between the two conglomerate plates. They may be, probably are, much thicker in some places than in others, hence the highest mountain tops may indicate abnormal thickness of one or both of these rocks. Thus "*Bald Rock*" the highest mountain in this region, composed wholly of these rocks is 1600 feet above sea level, and nearly, or about 1000 feet above the adjacent country; and the highest point of Coosa Mountain is 1500 feet above the Gulf, and of "*Laurel Point*" or "*Signal Point*" just southeast of it in "Double Mountain," is 1576 feet, and all this mainly, if not entirely, of Second Conglomerate rock. If these are not instances of abnormal thickness of this rock, then the estimate of 1000 feet for both conglomerates is entirely too low. Be that as it may, the fact is very evident that the mountains of the Coosa Coal Field, are mainly composed of these rocks, and that to their great thickness is due to the height and ruggedness of the mountains.

The Southwest Anticlinal.—One of the most important, and interesting features of this field, is the long denuded anticlinal starting near Kelley's Creek, in St. Clair County, and running almost a due southwest course to Peavine Creek, near Pelham in Shelby County, a distance of about 33 miles.

From a point opposite the end of Oak Mountain, a mile or two to the southwest of the line of the C. & W. R. R., this anticlinal in a northeasterly direction merges into the great Coosa Valley, and the anticlinal passes into a great thrust fault, to the southeast of which there are no

Coal Measures, but only strata of Sub-carboniferous and older formations. But from the end of OakMountain southwestward there are Coal Measures on both sides of the anticlinal and the displacement by faulting is much less. From this point to the end of the Coal Field near Pelham, is the line of that tremendous uplift which titled the *Coosa Mountain* to the northwest, and the *Oak Mountain* and *Double Mountain* to the southeast; which divided the dips of the strata and tilted the ridges like furrows on either side. Along the crest of this broken arch, denuding waters for ages have abraded and carried away the material until the anticlinal ridge has been reduced to a valley along which flow Bear Creek, two branches of Yellow Leaf, and branches of Peavine Creek.

Kelley Creek District.—This long and well marked anticlinal makes a very distinct boundary, and division between certain sections and basins in this field. To the northwest of it is the *Kelley Creek Basin*, which though not very productive, is very interesting on account of its well defined basin form. It is about four miles in diameter, and has its dips of strata directed or pointing toward the centre, where there is a space of horizontal strata. Like most, or all of the other basins, the steepest dips off strata are at the edges, these gradually diminish toward the centre and finally disappear altogether.

Dunavant or Shoal Creek Section.—Southwest of the Kelley Creek basin is a section ten or twelve miles long extending from the line between St. Clair and Shelby Counties, southwest to the township line between Tps 18 and 19, or to a low divide between the head waters of Shoal Creek, and Yellow Leaf Creek, which may be called the *Dunavant*, or the *Shoal Creek Section*. This section is not yet known to be a productive coal area, it is broken and ridgy, and derives its chief interest from the C. & W. R. R. passing through it, and by its deep cuts and tunnels exposing the structure, and giving a much clearer knowledge of the geological features of this section than could have otherwise been obtained.

The Howard Basin lies mainly in Township 19 of Range 1 West, on the head waters of the North Fork of Yellow Leaf Creek. The name *Howard* seems appropriate, it being the name of the first settler, and principal land owner in the region. The basin is well defined, with *Coosa Mountain* on its southeast side and *Big Oak Mountain*, or the edge of Cahaba Valley, on its northwest side. To avoid the appearance of confusion in description, it is here remarked that there are two *Oak Mountains* in the Coosa Coal Field. The northwestern edge of the field from Pelham to Carr's Gap is called "*Big Oak Mountain*," and the name *Oak Mountain* is given to a short high mountain lying on the other side of the anticlinal, to the southeast of of the Coosa Mountain, and northeast of Double Mountain.

In this basin the dips of strata from the enclosing mountain sides diminish very fast and in about half a mile the inclination has altogether ceased. The basin is about, or a little over, two miles wide and hence has a belt of horizontal strata in the middle, from a mile; to a mile and a quarter wide, and about six miles long. This is a beautiful little valley shut in among the mountains, perhaps rather too closely shut in for the welfare of its population. Coal has been cut here in several places, and there is no doubt that if there was a large demand here for coal, the demand could be supplied. On the bordering mountains there are several points of interest. On Big Oak Mountain nearly opposite the centre of the basin is "*Chimney Rock*," a tall natural obelisk of conglomerate, rising up to the height of the tree tops, and making a very conspicuous and interesting object. It is visible from nearly all parts of the basin, or from the opposite Coosa Mountain.

Nearly opposite the Chimney Rock on the northwest side of Coosa Mountain about half way up, is a great excavation made by a cloud-burst in the great cyclone of July, 1872. This great cyclone, charged with waterspouts and cloud-bursts, which passed over Alabama from southeast to northwest carrying disaster and destruction in its course, will be yet fresh in the memory of many. The excavation is in the face of the mountain, beginning just below a great ledge of almost perpendicular rocks. It extends from the ledge of rock to the foot of the mountain, making a clean cut excavation, and channel 60 feet wide, and three or four feet deep, straight down the slope. In this channel, earth, stones, roots, saplings, trees, rocks of many tons weight, were all swept down, making great moraine-like heaps at the base of the mountain. It is said that the volume of water rushing down here swelled the flood till all the bottoms, and level country were submerged. There is no doubt that the lapse of over twenty years has effaced much of the original magnitude of this water-spout's work, but a hundred years will not obliterate it.

Had this occurred in a place where waters could have accumulated, pond-like, before breaking loose, it would not have excited much surprise, but there was no chance for any part of the destruction to have thus resulted. It was a clear case of hydraulic action. The surroundings show that there was a discharge of water direct from the clouds on this spot, that it was concentrated here for some time; for how long we know not, probably for only a brief space, but with what force, or in what volume delivered, can only be inferred from the effects produced, where vast results, seemingly of years of action were here wrought in an hour!

This interesting spot is probably in S. 2, T. 19, of R. 1 West. Another one was seen about a mile farther to the southwest, in Section 10 of the same Township.

On the opposite side of the mountain but a little farther to the east, there are the signs of other cloud-bursts of the same date, and of yet greater magnitude. In one of especial prominence, a cut like a railroad excavation, but much wider, was made down the mountain, and rocks of all sizes that the mountain afforded were carried down to the level, and heaped and piled over acres of ground. It encountered nothing that could resist its force. The rocks transported by it would weigh thousands of tons. One rock in particular, and a well-known surface rock, which was estimated to weigh a hundred tons was carried half a mile from its starting point. The results produced here have to be seen to be realized; the weight of the material borne down by the flood is incalculable, and yet we are sure that the weight of the water was greater still.

In Sections 15, and 16, of Township 19, Range 1 West, the anticlinal ridge heretofore mentioned, which skirts the northwest side of Coosa Mountain, has very greatly increased in volume. It is now a very prominent ridge, and affects the dip of the strata much further on each side. Opposite the Big Narrows it cuts off part of the mountain, and changes the dip of Coosa Mountain gently to the southeast. Beyond this cut off point the mountain sinks rapidly, and the anticlinal ridge becomes more prominent and curves to the west, or a branch from it makes a junction with *Big Oak Mountain* and closes up the southwest end of the *Howard basin.*

Southwest of the Howard basin this anticlinal runs closer to *Big Oak Mountain*, and the Coosa Mountain is represented by a rocky, knobby ridge, which stands between it and the valley of Peavine Creek. Near Pelham both are merged into the southward curve of *Big Oak Mountain*, which forms the southwestern end of the northwestern half of the Coosa Coal Field.

Peavine Section and Double Mountain.—On the south side of Peavine Creek lies the "Double Mountain." This mountain as its name implies, includes two ridges close together. It is in fact an elevation composed of the First and Second Conglomerates, and their included slates, shales and other soft material. These have been more or less abraded and washed away, leaving always a depression, often a deep hollow, between the two conglomerate plates. This depression is more or less wide according to the thickness of the included, or inter-conglomerate strata. Where these strata are thick, and the two great rocky members of the mountain much separated, inter-conglomerate coal seams very probably exist. Several of these have been found and examined, and will be described in their proper places. The dip of this whole mass of mountain is steep, often 70 degrees to the southeast, *all of it to the southeast,* and both limbs of the mountain showing the same dip.

There is evidently *a great fault* running along the base of the mountain on its northwest side. The depth of this fault or the amount of displacement by it must be at least equal to the whole thickness of the uplifted, and displaced strata. That is estimated at from 1000 to 2000 feet; it may be safely put at 2000 feet southwest of the "*Big Narrows*," and above that point at 1000 feet. This fault runs the whole length of this mountain and of its continuation, called "*Oak Mountain*," to the northeast, and probably merges into the great Coosa Valley fault.

Along the edge of the valley of Peavine Creek, the magnitude of this uplift is clearly to be seen, and especially at the "*Little Narrows*" where the whole of the Lower Conglomerate is cut in two, and its full thickness, as well as that of the inter-conglomerate strata are fully exposed.

Assuming then that no more strata were involved in this lift fault than remain here now, their depth, or the amount of diplacement, would be correctly measured by a line drawn at right angles with the dip, from the inner-base of the First Conglomerate, to the outer-top of the Second. This line would measure considerably over 2000 feet of remaining strata, beside what has been denuded away from above the Second Conglomerate.

The gap called the "Little Narrows" is in S. 12, T. 20, R. 2 west. The gap is traversed by one of the head streams of the North Fork of Yellow-Leaf Creek, which rises between the two limbs of the Double Mountain, and flows northwards through its northwest half; thence northeast about five miles along the base of the mountain to the "*Big Narrows,*" where, meeting with other branches of this creek coming from the opposite direction, they pass through this formidable mountain again in this gap, the grandest, wildest and most rugged in the Coosa Coal Field. It has been very properly named "*The Big Narrows.*" It is truly a *narrow* gorge, and a *big* one. Some convulsion of nature must surely have made the break that let the waters enter here—it else seems impossible that this stream could have cut through such rocky masses by a gorge so narrow, and leaving so little sign of abrasion on the perpendicular cliffs. The rocks seem to be broken, rather than washed or abraded. Had the gap been blasted out with dynamite it would not have been left more wildly rugged than it is. From the top of the mountain to the water is over 300 feet, and the greater portion of this perpendicular. The width of the chasm is but little more than is required for the stream; with much labor a public road has been built above high-water mark along its side, through the first mountain, and by a bridge to the lower point of the second one, on the opposite side of the creek. A good road has thus been made through here, the only practicable place where it could have been made through this mountain. The fall of the creek is very great in this gorge, but principally at the points of entering and leaving it, or at the upper and lower sides. The work of abrasion is not nearly completed here; it will yet take many ages to wear down the rocks and equalize the fall in the stream. These narrows are in S. 28, T. 19, of Range 1 west. Another fact may be noticed in connection with these narrows, they must be at the lowest part of a downward flexure, or depression of the strata, that crosses the strike of the rocks, or the uplift of the mountain. This flexure must be at least fifteen miles in width, though evidently not very great in vertical depth. The head springs and streams of Yellow-leaf Creek arise on the opposite sides of this flexure, and flow down its slope in opposite directions, till they meet and unite just above the gorge, and presumably at the lowest point of the flexure.

Northeast of the Big Narrows the Double Mountain rather increases in height and ruggedness for five miles, and then culminates in the high point called *Laurel Mountain* or "*Signal Point.*" This is the highest point in Shelby county, and in the vicinity is often called "Signal Mountain," from the fact that a signal station was erected on its summit by the "United States Geodetic Survey," and made a point in their system of triangulation. Its height was then carefully measured and found to be 1576 feet above sea level. Its position is very near the meridian of Huntsville in S. 7, T. 19, of Range 1 East.

A little distance to the northeast of *Laurel Mountain*, there is a separation between the two limbs, or sides of Double Mountain, and a change of name also. The northwestern, or First Conglomerate side takes the name of *Oak Mountain*, and the southeastern or Second Conglomerate side is called *Pine Mountain*. In this region there is a much greater thickness of the inter-conglomerate coal measures than generally obtains in this field; hence the space between the two contiguous mountains is much greater. From this cause also arises those denuded cove-like regions called "*The Penitentiary*," the "*Johnson Bottoms*," the "*Cove*," &c. At least one good seam of coal was seen at several places in these inter-conglomerate measures, which will be treated of, and described in the proper place.

The trend of the mountains in this region is often complicated—while it is generally, and mainly northeast and southeast, yet it is in part north and south—and the dips of the strata are always at right angles with the strike. Hence it is very common here to find strata dipping east or west, or south, or to any intermediate point of the compass. The dips of the strata are all at high angles, generally 70 to 80 degrees.

Why the northeastern prolongation of Double Mountain should have been called "*Oak Mountain,*" when the northwest margin of this coal field, with which it has no connection, is also called "*Big Oak Mountain,*" is not known. It tends to topographical confusion to have two separate and distinct mountains in the same region called by the same name. The most probable reason is that they were both so named from the prevailing oak growth upon both. It is a notable fact that the timber trees on the lower or First Conglomerate are mainly of the different varieties of the oak, while the Second Conglomerate is principally covered with pine. This difference is very noticeable on the opposite' sides of the Double Mountain, the one being almost wholly covered with oak, and the other mainly with pine. This region is the most mountainous portion of the Coosa Coal Field, with the exception of a few long hollows and coves, it is all mountains, and most of these steep, high, rugged and rocky. It is only from the high tops of these mountains that a view of the region can be had, and its many grand scenes, and wild topography fully realized. From the top of *Signal Mountain,* standing as it does near the middle of this extensive mountain group and towering far above them all, the view is most magnificent and extensive. The whole southwestern end of this coal field lies around like an unrolled map, or panoramic painting; while far to the northeast the view is only limited by the still higher mass of "*Bald Rock Mountain,*" and "*Wolf Pen Ridge.*" To the east and southeast the view extends far beyond the boundaries of the coal field, and is limited by the blue and indistinct mountains beyond the Coosa Valley.

The Yellow Leaf Basin.—In the southwest corner of this coal field is its most extensive coal basin. It is here called "Yellow Leaf Basin," because it is traversed by, and wholly drained by, Yellow Leaf Creek; its north and south forks both flowing through it, and uniting within its bounds. In this basin there are no mountains, and but few high and rugged hills. The country generally is gently undulating, well watered, heavily timbered, and covered with a fertile soil. The region seems to be equally well adapted to mining, farming or the production of lumber. Most of this region is densely covered with a magnificent forest of long leaf pine, as yet unbroken save by the clearing of an occasional farm, or patch for cultivation. While the timber in quantity and quality cannot be excelled, and is probably not equaled by any other region in the Southern States. Shelby County has long been known and celebrated for its magnificent timber, and in former years much was obtained there and shipped to France, for masts and spars for the French Navy; and no portion of Shelby County is better timbered than this Yellow-Leaf Creek region.

The dip of strata over this basin is toward the southeast, and south, except along its south and southeast sides, where it is toward the north and northwest, in places only for short distances. It will be more definite to say that all around the edge or margin of this area, the dip of strata is toward the centre, and hence it has the basin form, and is properly called and described as a basin, or deep synclinal.

As yet no mining has been done in any part of this large basin, nor any great amount of prospecting, yet several good seams of coal have been discovered. The discoveries made give assurance of this being ultimately a good mining region. One of the seams found here, though only partly developed, already shows a larger volume of coal than any seam yet found in Alabama. When fully exposed it will probably exceed in size any seam of bituminous coal in the Appalachain Coal Field. It will be fully described hereafter under the head of details.

This basin contains about fifty square miles, and lies mainly in Township 20 South, and Ranges 1 and 2 West of the Meridian of Huntsville. This important coal area in its western part lies contiguous to the Louisville & Nashville R. R. near Siluria, and from this vicinity a branch road could be constructed to any part of this basin. It could also be reached by branches run from the Columbus & Western R. R. starting near *Sterrett's* or near *Vandiver Stations.* Either of these routes, for branch railroads, seems quite practicable, and one of them will no doubt be built whenever the assurance of sufficient freight and business is given to justify its construction.

Near the dividing line between townships 20 and 21, not far from the southeast corner of section 31 of Township 20 Range 2 West, the Double Mountain bends gradually towards the south around the southwestern end of this Coal field which it thus limits in this direction. In these parts the mountain goes by the name of *Locust Ridge*. It forms the divide or water shed between the head waters of *Buck Creek*, and the *South Fork* of *Yellow Leaf Creek*, and further eastward between the latter creek and the head waters of *Waxahatchee Creek*. About six miles east of Siluria it unites with *Salster Mountain*, in a high point called *Stony Butte*, composed wholly of conglomerate rock. From this point it curves southward about a mile, where making a short elbow, its trend becomes northeast and southwest. In recent years *Salster Mountain* has often been called "*Locust Ridge*" from the fact that the "harvest flies," the *cicada*, or American locusts, have been very numerous there on one or two occasions. The boundary fault runs close to the southeast side of this mountain, and in several places the rocks in the mountain are vertical. Its structure is the same as Double Mountain; and from "Low Gap," also called "Thomas Gap," to its northeast end its structure is like a trough with its sides dipping inwards, the southeast side to the northwest, and the northwest side to the southeast, each 80 to 85 degrees. The *Salster Mountain* appears to be the counter-part, or equivalent of the rocks of *Double Mountain*, which having passed beneath the fold, or basis, are turned up with reverse dip, and reversed in order on the southeast side of the field. This is a plain and concise statement of the manner in which this field is terminated at its southwest end, but the breaks and overlaps occasioned by the bending of the ridge produce much apparent confusion, and many scenes of wild topography. The *Salster Mountain* is not generally so high, or so uniform in uplift, as the Double Mountain, yet the bordering fault along the southeast side is generally very plainly marked. This line of fault with a general northeast trend—after crossing the Forks of Yellow Leaf, coincides with *Burket Mountain* to about the southeast corner of S. 19, T. 19, of R. 1 East, thence due north along a ridge called the *Divide* for about one and a half miles, thence northeast with said Divide to the foot of the *Potato Hill* near Sterretts, heretofore referred to and described. This is as far as it is now desirable to trace this southeast boundary fault. Returning back along this line of fault to the "Divide" at the northeast corner of Section 19, last referred to, thence northwest to *Pine Mountain* will begin to mark out the northeastern end of Yellow-Leaf Coal Basin. From Pine Mountain north and northwestward this boundary coincides with the drainage into the north fork of Yellow-Leaf Creek till it reaches the Double Mountains, thence southwest with them to the Big Narrows the beginning point.

The Penitentiary Region.—Northeast of the Yellow Leaf Basin, and embracing all the remaining portion of the field to the southeast of the anticlinal, is a very broken, irregular and mountainous region. It has no distinctive name, but as it embraces the noted locality called the "Penitentiary," that seems to be its proper designation. It lies on both sides of the Meridian of Huntsville, though much the larger part is on the east side, in Township 19 South. It is a region of mountains and coves that seem to have been arbitrarily thrown together. The continuity of all the mountains is more or less broken; some of them end abruptly and their places are supplied by coves, others change direction, making wider spaces between, with drainage areas and valley land occasionally, and canons and gorges where the streams break through the enclosing mountains. Some of these mountains have already been referred to in a general way, and the Signal Mountain in particular, but the most interesting features of this region are the coves and dells and drainage areas.

"*Signal Mountain*" with its naked conglomerate rocks, towers high above all surrounding objects, and seems to be the central point in this area of confused uplifts. A short distance to the southwest of the signal point, and crossed by the Meridian line is "Eagle Pond," a nearly circular pond of water with no outlet, on the top of that high mountain. A half a mile farther to the southwest are the "Lost Lands," an extensive tract of arable lands that are drained into the north fork of Yellow Leaf Creek. Less than a quarter of a mile nearly east of the "Signal Point," the great *Laurel Mountain* is abruptly terminated, and a precipitous descent leads down into the "*Penitentiary.*" This is not a place of penance, or punishment as its name would imply, but an extensive cove of good land which was considered a safe retreat from molestation in times of trouble, and about as difficult to get out of as if it were a penal institution. The waters that rise here make the head stream of the *Muddy Fork* of Yellow Leaf Creek, which breaks through a chasm or gorge of Sand Mountain, and is deflected northeast and north by Pine Mountain. Several coves exist along this stream, and coal has been seen at several places, before it reaches and flows around the northeast end of Pine Mountain. It is a romantic little stream with a very tortuous course; in its passage through many an alternating gorge and glen till it passes through the Divide and leaves the coal field, it has many shallow rapids and deep blue pools. But it flows through an unsettled wilderness, which, excepting one or two families in the penitentiary, has not now in any of its glens and coves or mountain sides, a single inhabitant in the whole space covered by this description. Toward the north and northeast a similar complication of mountain and cove exists for several miles, and ends abruptly with the flat, or gently undulating region adjacent to Bear Creek. The coal field ends with the mountains, the flat and undulating region succeeding is wholly of reddish colored shaly Sub-carboniferous strata, much contorted and very highly inclined. From the foot of the mountain for miles out toward Coosa Valley, there is no apparent change of material or structure. In the railroad cuts along the Columbus and Western road, from Coosa Tunnel to Sterretts, there is much of this kind of strata exposed. It is plainly seen that they have been subject to great pressure, and are much folded and faulted.

CHAPTER III.

DETAILED DESCRIPTIONS.

THE RAGLAND BASIN.

Boundaries. Historical Notes.

This basin embraces the northeastern end of the known productive coal measures of the Coosa Coal Field. It lies wholly in St. Clair County, adjoining the Coosa River at Ten Islands; and is mainly contained in Townships 14 and 15, of Range 5 East, with one tier of sections from the east side of these Townships in Range 4 East.

The boundaries of this basin are well defined by nature, and may be briefly thus stated; from Coosa River along Shoal Creek Mountain to Horse Shoe Gap, thence south to Trout Creek, and down it to its southern bend, in S. 13, T. 15, R. 4 East; thence direct to the mouth of Blue Spring Fork, and following up that stream to its head, thence a general northeast course to the Coosa River, and up it to the beginning point.

This has long been known as a good coal producing area; especially in the part of it adjacent to the farthest northeastern bend of Trout Creek, where the town of Ragland now stands. The first mining for coal was done here, and the product was known as the Trout Creek Coal. It is not definitely known when coal was first raised here, but as far back as 1847 it was being mined, and was well and favorably known in the coal markets, Prof. MICHAEL TUOMEY, the first State Geologist of Alabama, in his first Geological Report, published soon after this date, refers to these *Trout Creek Coals* in terms of high commendation. He considered these, and other coals of the Coosa Field, then being mined on Broken Arrow Creek, as the most promising coals at that time known in Alabama. The correctness of his judgment in this matter was fully verified from 1861 to 1865 by their selection by experts, for use in the large foundry works at Selma. All the known coals, that were available, in Alabama, were fully tested to determine their adaptation for shop and heavy foundry work, and the Coosa Coals were selected for the C. S. A. ordnance works, by the unanimous judgment of the experts in charge. Mining operations were put under charge of Maj. Campbell, an experienced Scotch miner, who with a sufficient detail of hands mined the coal, hauled it to the river, and boated it down to the "Coosa River Bridge," as the bridge of the E. T. V. & G. R. R. over the Coosa River was then called. The coal was there transferred from the boats to the cars and conveyed to Selma. During those four eventful years of the war much coal was mined here, but mainly on Government account. Previous to the war, and to a considerable extent since its close, coal has been mined here, and at Fairview and Coal City, and boated down the Coosa to Wetumpka and other markets, and much hauled in wagons to some markets east of the Coosa River. In all that wide extent of country from Jacksonville to Wetumpka, the Coosa, or St. Clair coal, was without any competition in the markets, and met with ready sale, and at prices that now seem fabulous. Forty cents a bushel, or ten dollars per ton of 2000 pounds, was not an uncommon price. All this has been changed by the building of the "*East and West Railroad of Alabama*" which passes directly by these mines, and enables their output to be placed in any market at rates far below the cost of private transportation. Coal mining has been carried on, at and near Ragland, with occasional interruptions for over forty years, dating back for its first commencement to about the years 1845–50. The first slope was sunk just northeast of the present town of Ragland, in Section 7, of T. 15, R. 5 East. The dip of the seam here was south 18 degrees at the surface, but it gradually lessened as the depth increased, and at 200 feet it was only 5 degrees. This old slope has been abandoned many years. A second slope was sunk northwest of the town and about one-fourth of a mile distant, and was operated for many years. The dip here was east of south, approximating southeast, and at the surface about the same as the other. This slope after being driven in to the length of 640 feet, was also abandoned. Work having been suspended for several years, and the mine filled up with water, the owners preferred, on resuming operations, to sink a new mine rather than clean out the old one.

Coal Seams and Mines.

The coal mine now operated at Ragland is one mile west of the town, on the same seam that the old openings were on, and which is known as the Ragland Seam. This opening is on the west side of the basin, and the dip of the seam is east to northeast 15 degrees, in one place 23 degrees at the surface; but the rate of dip gradually diminishes with depth, and at 200 feet from the mouth of the slope the rate of dip is only 5 degrees.

It is very clearly shown by the mining operations here that this is a shallow coal basin, with steep edges and flat, or nearly flat, bottom. Openings having been driven on different sides leave no doubt of its shape on the west, north, and northeast sides; on the south side no opening has yet been made, and it may be that the seam does not generally come to the surface on that side, as its outcrop was not observed, except at one place, there the dip is north, 45 degrees.

The strata exposed above the Ragland seam, of which there are very little, are mainly thin bedded yellowish sandstones and shales, in a few places the rocks seen were flaggy, and gray colored.. The rocks in contact with the seam are dark gray micaceous sandstones, and the underlying rocks for a considerable depth, as shown by outcrops, are also of this class. On the banks of Trout Creek, one and a half miles west of Ragland, this rock is shown in great abundance. A large quarry was opened here some years ago, and much rock gotten out and dressed, for the locks and dams of the Coosa River. This is a very superior and beautiful building rock, easily quarried, with but little waste, of strong and firm texture, and dressing well. It received such high commendation from some parties who were seen at the Government Works, who pronounced it the best sandrock they had ever seen worked, that very special pains were taken to examine it. It was found on examination to fully warrant all that had been said in its favor. This fine quarry is now abandoned, and the rock is no longer used in the Coosa River improvements.

There are two belts or plates of blue-gray micaceous sandrock in this coal field, though they are probably far from being of regular, or uniform thickness. The lower one is seen to be very massive and bowldery, the upper one well stratified, but not regular in thickness. It is this one that is so prominent in the Ragland basin, and on Trout Creek.

All the coal as yet mined in this basin has been taken from the Ragland seam. It is very regular both in thickness, and in quality, varying in places from 36 to 30 inches of solid coal; no partings, or seams of slate. This coal has always had a fine reputation, but its merit will be best shown by the following analysis from an average sample, made by *Dr. J. M. Pickel, Analyst*, Prof. of Chemistry, University of Alabama.

Analysis of aver-age sample, run of mine Ragland, Alabama:

Moisture	.56%
Volatile Matter	31.77 "
Coke	67.67 "
	100.00
Ash	5.64 "
Sulphur	1.70 "

This coal seam is not extensive, it underlies about one thousand acres of ground, and over most of this area it is the top seam; yet lies deep enough for easy and safe mining. Some slates above the seam are taken out to give room for easy working, and above these is a solid rock roof perfectly safe. The arrangements at Ragland for washing the fine coal, carrying it up by elevators to be loaded into chute cars, and dumped into the coke ovens without manual labor, are as economical and perfect as could be desired. The coke ovens (Thomas patent,) are rectangular, and they are emptied of coke at one operation by a big scrape, pulled by a small engine with wheel and axle. By these arrangements the cost of making coke is reduced to a minimum. The size of the ovens is 10 x 30 feet, and each one takes a charge of 12 tons of coal, which when burned 48 hours, which is usual, will yield five tons of coke. The manual labor required to charge an oven, and to draw, and water out the coke, amounts to about six hours labor of one man, including the services of the boy to run the little stationary engine.

At the new mine, works are being put up to wash the coal direct from the tipple, and dump it into the coke ovens without any transportation; this will still farther reduce the cost of making coke by saving at least the cost of freight to the coke ovens.

At this mine all the slack or fine coal is carefully saved, and washed for coking, and for blacksmiths' use. In this form it has received very high commendation as a shop coal in all sections where it has been introduced. Its freedom from all dirt, and from nearly all sulphur, and its immediate availability for coking, make it a most desirable shop coal.

The following analysis of a sample, taken out of a car load of this coal, shows the qualities of an average lot as produced at the new mines:

Moisture	0.64%
Volatile Matter.....	32.13 "
Coke	67.23 "
	100.00
Ash................	5.81 "
Sulphur...........	1.73 "

Dr. J. M. Pickel, Analyist.

The coke made from this washed fine coal is of very superior quality, as shown by the following analysis of an average sample by Dr. J. M. Pickel, Analyst, in School of Chemistry, University of Alabama:

Analysis of Ragland Coke.

Moisture.........	0.14%
Volatile Matter...	1.06 "
Coke	98.80 "
	100.00
Ash.............	10.41 "
Sulphur	1.81 "

or

Moisture.........	0.14%
Volatile Matter...	1.06 "
Fixed carbon.....	86.58 "
Ash	10.41 "
Sulphur	1.81 "
	100.00

To show the excellence of this coke the following table presents for comparison with it, the analyses of three of the best cokes made in Pennsylvania, including the celebrated Connellsville Coke, made from washed coal in the upper Connellsville district. Taken from "*Mineral Resources of the United States, 1892.*"

	1. Connelsville District, Pa.	2. Alleghany Mt. or Clearfield District.	3. Walston or Reynoldsville Dist. Pa	4. Ragland, St Clair Co., Ala.
Moisture......	0.033%		0.427%	0.14%
Volatile Matter	0.713 "	3.65%	0 753 "	1.06 "
Fixed Carbon.	88.274 "	85.80 "	87.695 "	86.58 "
Sulphur.......	0.880 "		0.897 "	1.81 "
Ash...........	10.100 "	10.55 "	10.288 "	10.41 "
Totals.........	100 000	100.000	100.060	100 00
Analysts......	A S McCreath		A.S.McCreath	Dr J.M.Pickel

The following table shows its qualities compared with leading Alabama cokes, as given by the respective mines, and taken from the same authority.

	1. Pratt.	2. Henryellen.	3. Ragland.
Moisture................		.300%	.14%
Volatile Matter.........	.93%	3.360 "	1.06 "
Fixed Carbon...........	83.27 "	84.987 "	86.58 "
Ash....................	15 06 "	10 630 "	10.41 "
Sulphur.................	.74 "	.723 "	1.81 "
	100.00	100.000	100,000
Analysts................	A. F. Brainard	A. F. Brainard	Dr J.M Pickel

These tables show that the Ragland Coke is one of the best of the cokes of Alabama, and takes rank with the leading cokes of the United States. But in justice to its merits it must be further stated, that the sample analyzed was not selected by the owners, nor taken from an oven specially handled to attain the best possible results, but taken off the pile as an average of the products of all the ovens as burned, and sent to market. Coke ovens are usually burned about 48 hours, but sometimes 72 hours to attain a better, though diminished product. By the longer process of coking, the amounts of volatile matter and sulphur, are reduced, and the percentage of fixed carbon proportionately increased. What percentages the Ragland Coke made by the longer process of coking would show, is not known as none of that kind could be had for analysis.

The Coal seam that has been mined at Ragland for the last forty or fifty years, has been regarded up to this time as the only seam in the Ragland Basin. This is a mistake, as there is another seam lying to the south of it, and above it, that was cut by a shaft sunk some years ago, about three quarters of a mile south of Ragland. This seam is known as the Peacock Seam, because it is of that quality of coal that shows an iridiscent sheen in certain angles of light, like the sheen of the peacock's tail. The thickness of this seam is not exactly known, but reports say it is ample for all mining purposes.

For many years past it has also been known that coal exists on Bridge Creek, in one or more seams, although no mining has as yet been done in that region. Efforts were made by the Survey to determine the thickness of these seams. Explorations showed that coal exists in many places along Bridge Creek, but the region is a wilderness, and it was not practicable to find hands to work, or sustenance for hands, to develop this coal. A wide expanse of country along Bridge Creek, and around its head waters, and between the First and Second Conglomerate ridges, here evidently contains coal seams, and, as shown by partial development, of considerable importance. But on the south side of the Second Conglomerate ridge, called Backbone Ridge, it was noticed that there was the outcropping of an important coal seam. Mr. J. C. Reed of Ragland was employed to develope the prospect. He reports as follows: "Opened on a seam supposed to be in S. 35, T. 14, R. 4 East—Coal 38 inches—about 2 miles northwest of Ragland."

The position of this coal seam is about half a mile south of an uplift of Second Conglomerate that extends from near Trout Creek, in nearly a north direction, towards the Coosa River. The public road from Fairview to Greensport extends along the top of this uplift, and is known as the "Backbone Road." It is probable that the opening made by Mr. Reed is in S. 31, T. 14, of R. 5 East, and near the Township corner, as that better agrees with the reported course and distance from Ragland, and from the Second Conglomerate ridge.

Should this seam prove to be as good as the Ragland Seam, or approximate it in quality, and maintain its reported superior thickness, its discovery will add very greatly to the value and importance of this portion of the coal field. It lies so much lower in the measures than the Ragland Seam, that it necessarily unlerlies a much larger portion of the basin—its area must be five or six times greater than that of the Ragland Seam. Then its discovery almost gives assurance of other seams lying between it and the Ragland Seam. It would be unreasonable to suppose that in the productive measures so wide a space as lies between these two seams; should be destitute of coal.

The dip of strata at, and near the Reed opening, is 18 degrees southeast. This is generally the rate, and the direction of the dip, to the town of Ragland. If the rate, or degree of dip of the strata at the surface, could be taken as a reliable datum to calculate the thickness of the coal measures, the two miles and a half, from the Second Conglomerate to the town of Ragland, would give there a depth of over four thousand feet to that rock. This would be unreasonable: and we have already seen that the surface dip is often greater than at any inferior point, and that in the basins, so far as yet seen, the dip of strata describes a regularly diminishing curve, from the surface to the bottom of the basins. Hence no reliance can be placed on the estimated depth of a basin, when calculated alone from the dips of its surface strata. This mode of estimating thickness of strata may be in our valleys, and many other places, approximately correct, but is not considered reliable when applied to measure the depth of a coal basin.

Outcroppings of this newly discovered coal seam may be confidently looked for in a northeast direction from the Reed opening to the head waters of Bridge Creek; and in an east by north direction near said creek towards the Coosa River. It is not believed, however, that any available amount of coal will be found near the river. The measures are there pressed together, forming a closed synclinal, with the bordering conglomerate rocks on each side becoming nearly, or quite vertical, and approaching each other at angels and uniting at Ottery basin immediately east of the river at Ten Islands. These are the rocks which make the Ten Islands, and the shoal at Lock No. (2) two.

It has been reported and published widely, that coal had been found in the Coosa River: one published statement being, that it was reported that a seam of coal "3 feet in thickness was struck in the Coosa River in blowing out the channel to Lock No. 2." Investigation here showed that these reports were very much exaggerated, if not wholly incorrect.

It was learned that Major Singleton, who was then in charge of the work, had stated that coal was found there about the thickness of a man's hand. From this it was inferred that a thin seam of about 4 inches thick had been found there, which was not considered at all improbable, as thin coal seams are well known to exist below the First Conglomerate which was probably the rock on which the blasting was being done. But afterwards by accident the man who did the blasting, and found the coal, was seen and interviewed on the subject. His statement was freely given, as follows: "Yes, I am the man who found that coal. It was a chunk wedged in among the rocks, as large, or larger than a man's hand. I carried it to the shop and tested it; it would burn, it was *certainly coal.*"

It has also been asserted that coal was found in blasting the channel of Lock No. 3; if this was a fact, the coal was not in place. It must have been some drift coal washed into crevices of the rocks. Lock No. 3 and its approaches are wholly outside of the coal field, and environed by older strata.

Neither, so far as yet known, have any coal seams been found east of the Coosa River, in Calhoun County.

It is very desirable that they should be: and while intelligent search and effort to find them should be encouraged, the present state of our knowledge will not afford much assurance of success.

For a description of the region east and northeast of the Coosa River, the reader is referred to the introductory chapter on Calhoun County.

Prospects of the Ragland Basin.

When the works at Ragland were examined, the business of the country was in a depressed condition, and the demand for coal and coke was very limited. The out-put and the number of hands employed were also both limited to the market demands. Only about 100 tons of coal were raised per day, and of this, probably one half was converted into coke. The mines are well equipped with all the necessary appliances for mining, and handling the coal, while the location of both mine and coke ovens, close to the track of the "East and West R. R. of Alabama," secures ample and expeditious transportation. This is the nearest coal to the great iron ore deposits in Calhoun and Cherokee counties. These are among the largest deposits of brown ore in the state, and their reduction by the use of coke in the future must be vastly increased over their present conversion by the use of charcoal. The enterprising towns of Jacksonville and Piedmont alone, surrounded with iron ore and bauxite as they are, will require at no distant period, large amounts of coal and coke to run their public works, and supply their domestic demands. The largest part of the fuel required by these prosperous towns, and by the whole of Southeastern Alabama and Southwestern Georgia, must in the usual course of business be drawn from the Coosa Coal Field. It is the nearest source of supply to all this very extensive market, which now promises to increase its demands for fuel faster than the Field increases its output. In this prospective future the Ragland basin will have very material advantages, not only in greater proximity to market, but also in means of transportation. The improved, and now navigable portions of the Coosa River, bounds it on two sides, and will give cheap water carriage, in addition to the facilities afforded by the "E. & W. R. R. of Ala." for carrying its products to market.

This basin also holds large quantities of *limestone* suitable for furnace flux and lime making; and will yet be the scene of extensive quarrying operations. This is the only deposit or exposure of *Carboniferous or Mounatain limestone* in this region, and its utilization in the future for the purposes stated is confidently expected. In addition to limestone this basin also holds large quantities of available sand of the kinds suitable for building and moulding. These are in immense quantities in many places along the course of Trout Creek, below where it has cut through the higher coal measures. The sand is of good quality, and in fineness appears to be graded by the descent of the stream. A few car loads only have as yet been sent from here to market; but it will, when better known, be more in demand. It appears to be largely the debris of the building stone ledge heretofore described, and of the finer grained shales which overlie it.

Materials for making fire brick are apparently here in abundance. In several places, but more especially in the northeast corner of the basin, are extensive tracts covered with the broken down and abraded conglomerate rocks. This material is nearly pure silica, very refractory, and in the most available form for mixing with good clay, like the under clay of the coal seams, to make fire bricks. Probably the under clay of the coal seams is the very best material that exists for this purpose. Attention was called to it by *Prof. Tuomey* in his first Report on Alabama, as material that was eminently "fire brick clay." It is of this material that the Scotch fire brick, the best that the market affords, are made. To be available as fire-clay it must be as far as possible destitute of lime, iron, potash, or soda, either of which would operate as a flux to the silica, producing vitrescence of the mass. Many of the under clays are adapted to making fire brick, being composed of the proper material, and also because they are permeated by carbonaceous matter from the roots of the coal plants; this is burned out in firing, leaving the bricks porous, and hence able to withstand the changing degrees of heat without change of volume. If beds of sufficient thickness to be available, exist here under any of the coal seams, they ought to be carefully tested, and if they carry neither iron, nor any of the mineral alkalies, they are assuredly suitable as a basis for making the valuable and indispensable fire brick.

In the examination of the Ragland Basin, valuable aid and information were obtained from the Brown Bros., who are operating the mines at Ragland, also from J. C. Harris, superintendent and mine foreman, all of which is here very gratefully acknowledged by the Survey.

The thanks of the Survey are also due to Esqr. Henderson, and J. C. Reed for services rendered in the prosecution of the work.

Also to the officers of the E. & W. R. R. of Ala. for transportation furnished and courtesies extended.

CHAPTER IV.

THE FAIRVIEW SECTION.

Boundaries and Structure.

Immediately southwest of the Ragland Basin the Fairview Section begins. The dividing line between them is approximately Trout Creek, from the southeast side of the coal field, up to the Township line between Tps. 14 and 15, South, thence northwest to Shoal Creek Mountain. From this line it extends southwest to the margin of the Coal City, or Broken Arrow Coal Basin. The line between Coal City Basin and Fairview Section is not marked by any great elevation or depression of the surface, but by a break of the coal seams and change of strike in the strata, and of dip along a line circling round from the mouth of *No Business Creek*, towards the north and northwest, and forming the edge or margin of the Broken Arrow Basin on the north and east sides, in its crescent or eliptical form, and extending westward to the southwest end of Pine Mountain.

The Fairview Section does not exhibit the basin form so clearly as the preceding, but shows a general southeast dip of strata varying from ten to eighteen degrees, generally about fifteen. This uniformity is broken only by one line of vertical strata, about three hundred to four hundred feet broad, which extends entirely through the Section, from Trout Creek in S. 2, T. 15, R. 4, E., to the southeast side of the Field, near the mouth of No Business Creek.

The Fairview Section embraces about the same area as the Ragland Basin, (from 35 to 40 square miles,) but presents a much greater show of coal seams. Near the little town of Fairview, which is a station on the E. & W. R. R. of Ala., much mining has heretofore been done, on three different seams of coal; and another, a mile and a half to the south of the station, now known as the Inman Seam, has also been extensively mined. Besides these four, seven or eight other seams have been cut in this section, and more or less coal taken out of each. Nearly all of these seams are thick enough to be mined, as they range in thickness from two and a half to four and a half feet.

In making a rather hasty, and hence rather imperfect reconnoisance of this section, it was very clearly seen that many coal seams of uncertain size are yet unexposed. There is here a very great thickness of coal measures, and if they are not unusually barren of coal, we may reasonably count on this section containing from fifteen to twenty seams of coal.

Crossing the strike at right angles from Fairview to the northwest side of the field, a distance of three miles on an air line, there was no apparent duplication of strata. It is hence inferred that no faults exist in this section from the vertical strata, ¼ mile south of Fairview, to the top of Shades Creek Mountain, a distance of 3¼ miles; if so, it presents one of the best places seen in this Field to estimate the thickness of the coal measures, *provided* the dip of the strata at the surface can be relied on to estimate vertical depths. We have, however, already seen good reason to doubt this in basin structures, and it may be that all uplifts give curvature of dip. That they must do this to some extent, seems very evident, when we reflect that the differences in surface dips, often great, would if extended downwards indefinitely, produce great unconformities of strata. Two ledges of rock, the lower one dipping 40 degrees, the upper one 20 degrees, may join together at the surface, but at the depth of 1000 feet, unless there is a curvature of strata, they would be widely separated, with no known strata intervening. Hence not only would unconformities occur, but many a wide hiatus would exist in all contorted strata. All this is most probably avoided by the greater curvature of the steeper dips, and their conformity to those less highly inclined. Hence in estimating thickness of strata by surface dips, it is safe only to calculate the less, and exclude, or disregard the higher or steeper dips. Following this rule we find the average of the lower dips in the space under consideration to be 15 degrees, or 3¼ inches per foot; indicating a depth or thickness of coal measures at the vertical strata, or near the middle of the field, of about 4650 feet, to the top of the First Conglomerate. It is probable that the thickest part of the measures is near the vertical section on the northwest side, and that on the southeast side of it, the base of the measures has been elevated by successive thrusts, or faults, till the First Conglomerate is pushed above the level of the southeastern edge of the field. In the part now under consideration there has been much denudation along the middle part of the field, by the branches and affluents of *No Business Creek,* and some four or five hundred feet of the upper, or newer portion of the measures, which exist further to the southwest, are not found in this section. Yet enough is seen of the successive exposures, and of the character of strata, to make it probable that, at least in parts of this Field, the coal measures are as thick as in either of the other Coal Fields of Alabama. Indeed, all the great rock plates as yet examined, show increased volume as we go eastward, and it may be that when the drill is applied, the Coosa Coal Field will be found with increased thickness in all its strata, and a greater volume of measures than either of the others, or than is now estimated. This is only a reasonable expectation, as it is a well known fact that all of the coarser strata thicken towards the east, hence some increase may be assumed to exist also towards the southeast in every member of the coal measure series.

Topography.

The topography of this section may be very briefly described. There is first an outer rim of Lower Conglomerate rocks, making Shoal Creek Mountain, on the northwest; then a valley half a mile wide between it and Rocky Ridge on the southeast. This valley is upon the interconglomerate Coal Measures, and Rocky Ridge is composed wholly of Second Conglomerate rocks which are sometimes plicated into one high bold ridge, sometimes broken into two or three parts, or duplications; these have generally a very steep southeast dip, from 20 degrees up to 80 degrees, though generally from 30 deg. to 35 deg.

Southeast of the Second Conglomerate ridges is, for a mile or more, an undulating and broken country in which no coal seams were observed. In this region gather the head waters of Trout Creek, and some of the head streams of No Business, and Broken Arrow Creeks. In the descent of these streams some coal is exposed in the ridges, but much more in the central denuded valley of No Business Creek, and its branches. Southeast of this valley high ridges and broken ground make the country, to the high southeast rim of this section of the Coal Field. This outer rim is here generally the highest land, and it is sometimes composed of Coarse Conglomerate, whose age could only be inferred from its position. As only one Conglomerate makes its appearance on this southeast side, it was inferred that this was probably the Second one, and that the First was engulfed in the fault that cuts off the Coal Measures on the southeast side. To infer that this is the First Conglomerate involves the greater difficulty of accounting for the absence of the Second, which must then be assumed to have been engulfed in another fault, of the existence of which we have no evidence. Besides, all the faulting observed on this side of the field has been by upward thrusts, whereby the base rocks have been successively elevated to their present positions, and in no case by the reverse action, or down throw of the strata.

These constitute the main features of the topography, except that from near the border of the Ragland basin there is a gradual declination of the measures, principally by denudation, towards the southwest till the borders of Coal City basin, and Broken Arrow Creek are reached; this is more especially noticeable through the middle part of the Fairview section.

Coal Seams and Mining.

It is stated on information that the first discovery of Coal in this Field was made at a hunter's camp near where Fairview Station now stands. This was upwards of fifty years ago when the country was mainly unsettled, but often visited by hunting parties from Calhoun and Talladega Counties. The memory of the spot where stone coal, as it was generally called, was first pulled out of the branch, is well preserved; and in after years much coal was taken out at this place by stripping the seam. This seam is stated to be *four feet,* four inches thick, with a four inch parting near the middle. This seam bears the name of the *Fairview Seam,* and was first opened in the N. W. ¼ of S. 10, T. 15, of Range 4 East, about 150 yards N. W. of Fairview Station.

Another seam known as the *Higginbotham Seam* was also opened near the same place; the horizontal space between the outcrops here was only 50 feet, and the vertical height of the Higginbotham above the Fairview Seam is only about 15 feet. And as no bar of rock intervenes between them, they may approach closer together, or even unite farther to the northeast. But a little over half a mile to the southwest, where both of these seams have been more thoroughly exposed the horizontal space between their outcrops is 180 feet, and upwards of 50 feet of vertical strata intervene, including a heavy ledge of coarse, hard gray sandrock. Still farther to the southwest it is evident that the intervening rocky ledge becomes still more massive, and these seams are yet farther apart.

The Higginbotham seam carries 30 inches of coal, of fine quality, very regular and free from slate. It has a good roof, but has not been undermined; as the Fairview Seam possessed superior advantages from its superior thickness, it was of course selected for mining operations by the company which owned both seams. The Fairview Mining Company acquired a good property in Coal lands, and upon the completion of the E. & W. R. R. of Alabama they started energetically to work to develop it. A slope was sunk a little over a half mile southwest of the Fairview Station, on the Fairview Seam, and the mining of coal was here vigorously prosecuted for several years, with all the appliances, and facilities for mining and transportation that were necessary to insure success. It is said that after a period of very successful operation the company became involved from causes wholly outside of their mining and marketing business, whereby they were compelled to close up the mine, and abandon their works.

About 250 yards northwest of the Fairview Seam and considerably below it, is the *Chapman Seam*, carrying from 2½ feet to 3 feet of solid coal. This is an excellent seam of coal, and was very widely known in the past. A great deal of coal was taken out of this seam by stripping, which did not involve much labor, as the outcrop of the seam was in a flat branch bottom coming near to the surface. The coal was greatly in demand and was hauled in wagons to supply the market over a wide extent of country. The price justified the labor, as it sold at from 20 to 40 cents a bushel, or from $5.00 to $10.00 per ton according to the distance hauled.

This valuable seam of coal also went into the hands of the Fairview Mining Company, and no coal has been taken out of it for several years past—nor is there any present prospect of operations being resumed by that company.

These three seams of coal appear to constitute a group. They lie close together, three hundred yards will cover all three of their outcrops; they are often all found on the same forty acre tract. It would have been very desirable to give an analysis of the coal from each of these seams, for comparison with coals from other sections, but fair samples from them could not be had in their present condition. These seams are further grouped together by ledges of coarse, gray sandrock intervening between them. These ledges present the same appearance and characteristics. Nothing could be recognized in the ledge between the Chapman and the Fairview, to distinguish it from that between the Fairview and the Higginbotham Seams. The rocks are remarkably homogeneous, partially quartzitic, and would be classed in the Fourth Conglomerate group, but for the total absence of pebbles which are usually conspicuous in that Conglomerate. And it may be further remarked that neither these rocks nor coal seams have been clearly recognized in any other section of this Coal Field, except this and the Coal City basin. They are not seen in the Ragland basin, unless the Ragland Seam represents the Chapman Seam; they are about the same thickness, and have roofs somewhat similar, but the enclosing rocks are wholly different, and the other seams of the group are also wanting, and the seam which lies next above the Ragland Seam evidently belongs to another part of the vertical series.

In the Coal City basin the rocky ledges separating these seams have almost entirely disappeared, and the seams also were lost after passing Broken Arrow Creek. If they exist southwest of Coal City basin they have been so reduced in size, and changed in appearance as not to be recognized or identified. On re-examining this ground in 1894 a fourth seam was discovered in this group, its outcrop is 50 steps south of the Higginbotham Seam, indicated thickness about three feet.

Northwest of the Chapman Seam on the head waters of Trout Creek, in S. 4, T. 15, R. 4 E., a good seam of coal has been opened on the Carson place, and hence known as the *Carson Seam.* The opening made some years ago into this Coal Seam was nearly filled up, hence a measured section could not be obtained; the following is given from observation, and information from parties familiar with the seam:

Section of Carson Seam.

Sandy Slates	25 feet.
Clay Slates.........	4 "
COAL, good.........	3 " 2 inches
Under clay.	

Another opening had been made on this seam about a mile to the southwest a good many years ago. It is represented as about the same in all respects as the Carson opening.

In S. 3, T. 15, R. 4 East, about ½ a mile northeast of the Carson opening, there is a show of Coal in Mrs. Hawkins' Spring, and another seam crosses the spring branch, (running south,) known as the *Hawkins Seam.* One of these is probably identical with the Carson Seam. No coal has been taken out of either place, and hence we have not the data to decide positively on this point. The strike of the out-crops would correspond fairly well, but the difference in their elevations is such that the Hawkins Seam may be a hundred or more feet below the Carson, there are no surface rocks here by which to trace the outcrop of seams, and thus prove their identity.

From the Carson Seam to the base of the Second Conglomerate ridge, or "rocky ridge," as it is locally called, a distance of over one mile, there is no exposure of coal. There are no ledges of rocks above the surface in this space, and although there probably are seams of coal enclosed, they make no outcrop, and in the absence of both fossils, and outcrops of seams, their discovery is solely the result of accident.

It is a well known fact that the measures lying just above the Second Conglomerate are not very productive, but the space in question, over 1300 feet vertical, is too great to be wholly destitute of Coal Seams. That some seams exist in this wide space is inferred from analogy, and comparison of this with other coal areas; and the fact that they have not yet been found and opened, is mainly due to the want of persistent effort for their discovery. The supply of coal already known in this region very far exceeds the demand. Coal Seams are hence of little value in public estimation, and for many years past no effort has been made for discovery or development along this line in the Fairview District.

South of the Carson Seam, where the strata are cut by the streams flowing southwards into No Business Creek, there were good indications of coal seen in many places. An excavation was made at one place where a fine show of fossil coal plants seemed to mark the outcrop of a Coal Seam. This was in S. 9, T. 15, of R. 4 E., and about half way between the Carson and the Chapman Seams. A large amount of beautiful fossil impressions in the rocks were obtained, but only thin streaks of coal, and no under clay existed there.

Southwest of this place in S. 17, T. 15, of R. 4 E., and probably in the S. ½ of N. E. ¼ of said section, on the Findley Branch, a prong of No Business Creek, a coal seam has been cut, about two feet thick, and near the same place there is a thin seam of one foot thick. Coal has been taken out of both in former years, but as the seams were too thin for profitable working, they are now abandoned.

Near New Prospect Church in the S. ½ of S. 18, T. 15, of R. 4. East, are several exposures of a large seam of *coal and bituminous shale*, 4 to 5 feet thick at outcrop. No excavation or cut had ever been made into this seam, and hence it is unknown what amount of it may be coal. So far as seen there was a large excess of the shale—

black, crumbly, and carbonaceous; and in this may be included more or less decomposed coal. An effort to open up this coal seam would have been very gladly made, had it not been evident from the nature of the ground, that to do so satisfactorily would require more labor and expense than the means of the survey would allow.

Bituminous shale is often found in this region in connection with coal, as also in the Coal City mines to be described hereafter—and also in seams which carry only slight traces of coal. In a railroad cut near to No Business Creek, a seam of this character runs through the cut; it is 15 to 18 inches thick, has under clay, and all the external features of a coal seam, yet carries no coal —being wholly composed of bituminous shale. In this instance at least, if not in all others, the bitumen has evidently been derived from carbonaceous material—from matter in all respects like that which produced the coal seam—but which became in some way largely and intimately mixed with fine argillaceous sediment, producing *shale* instead of coal under pressure. As it is of common occurrence in this coal field it will be necessary to make further reference to this material hereafter.

About a quarter of a mile south of the large Fairview seam, there is another group of seams lying close together. The first of these was opened out by the survey. It showed at the outcrop a solid body of coal 33 inches thick, and was judged to carry over three feet of coal when the entry was cut beyond the reach of sub-aerial decay.

The second seam had been dug through in a pit many years ago; it is not believed to be a thick seam, as no further attention has been given to it since its discovery.

The third seam in this group is the largest, and presents some very peculiar features. It was first seen, in the progress of this investigation, on the west side of Trout Creek in the S. E. ¼ of S. 2, T. 15, R. 4 E. as a vertical mass of sandy carbonaceous matter. It does not make a coal seam at that place, but careful observations show that it is a large and solid coal seam, where it has been dug into, three quarters of a mile to the south west of this point, or rather south 30 degrees W., which is the true strike of the seam.

Near Trout Creek the exposure is made by the wash and wear of an old road, and shows coal streaks, soft and coaly or carbonaceous matter, mixed with soft sandstone, making a vertical mass *fifteen* (*15*) *feet thick*—and flanked on each side by vertical, soft, reddish colored sandrocks. While 40 steps to the northwest of this spot the rocks were plainly seen at the creek, dipping 3 degrees S. E.—A fault with large amount of displacement exists here, and this seam of coaly matter is near the fault. The structure as far as can be seen gives no evidence of a fold; and the space between the almost horizontal and vertical rocks is too small for the change to have been made in any other way than by a clean cut fault.

About a hundred feet south east of the coaly seam the rocks are again visible, they are still vertical and very hard. The whole breadth of the vertical rocks and very highly inclined strata, is about 300 feet, but it is much contorted in places for a greater distance.

Following the course of the seam from its exposure in section 2, south, 30 degrees west for about three quarters of a mile to the crossing of a branch in S. 9, T. 15, R. 4 East, about ½ mile S. E. of Fairview station, there is exposed a seam of good coal, solid, four (4) feet thick, but *vertical*. A pit had been sunk on it at the edge of the branch, and sufficient coal taken out to clearly show the structure, size and quality of the coal seam, and its trend or strike. Acting under the belief that the seam would not continue vertical for any great depth, a shaft was sunk fifty feet southwest of the branch, and immediately on the southeast side of the vertical seam. It was very confidently believed that this shaft would at no great depth intersect the coal seam in its southeast deflection; but at the depth of *sixty feet* no deflection was apparent, and the work was stopped.* The shaft has now just caved enough to show the vertical wall of coal on its southwest side. Since the completion of the shaft no further effort has been made to develop this seam.

This vertical section and line of fault does not show any ridge or elevation of the surface by which it might be traced, or pointed out; and its existence is not shown except by the accidental exposure of some of the underlying rocks. It is believed to extend through the Fairview section, because a vertical coal seam of about the same thickness, appearance and trend, is found near the southeast edge of the coal field, near the mouth of No Business Creek; and from the evidence presented its identity with the one near Fairview Station is very confidently assumed.

On the southeast side of the vertical seam search for coal was made along *Coal Branch* in section S. 16, and parts of 21 and 28, in T. 15, of R. 4 East. *Three seams* were found in this space. The first was opposite the old *Inman Mines*, and believed to be the western extension of the *Inman Coal Seam*, which was extensively mined in former years, and from which much coal had previously been raised by stripping the seam. This is very good coal; seam running from two and half feet to four feet thick; roof dark gray micaceous sand rock, carrying many fossils.

The next seam beyond the Inman was only partly exposed in the branch and its thickness is not known. The third seam is about three quarters of a mile west of the Inman Mines, it was formerly known as the *Alverson seam;* a good deal of coal was taken out of it many years ago by stripping the seam. It is reported to be three feet thick, and of good quality. The existence of still another seam beyond the Alverson was plainly shown by coal washed up in the branch at the lower end of a deep hole, but it is probably thin.

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* It is possible that a shaft on the northwest side of the vertical measures would have been more successful.—E. A. S.

These three, or four coal seams are known to exist on the southeast side of the vertical seam, in sections 16, 21, and 28, of T. 15, R. 4 East, or towards the southwest end of the Fairview section. Another seam differing greatly from either of these, was dug into by the survey about three-fourths of a mile southeast of the Fairview Station; it had never been opened at any other place, and had features differing from any coal heretofore seen. It is of varying shades of *brown color* with iridiscent sheen, or luster, a peacock coal, and apparently saturated with oil. Only the partially decomposed out-crop was reached in the opening made, but even that burned freely, and coked well in the forge. The volume of this coal seam is not known, the out-crop was not supposed to be more than an undecayed remnant of the seam. It was only 16 inches thick at the edge, but this is sure to be increased, perhaps greatly, by further development.

It is thus shwn that there are at least four coal seams on the southeast side of the vertical seam, or fault section, two of which are known to be thick minable seams, and to carry good coal. The *Inman Seam*, when worked, had a very fine reputation, and it was mined extensively for many years. The works here were of the most approved order, for mining, and elevating the coal, and for screening and loading it into the cars. A branch road one and a half miles long connected the mines with the East & West Railroad at Inman Junction (probably in S. E. ¼ of S. 30, T. 15, R. 4). These works which, as nearly as we can now place them, are in S. 28, T. 15, R. 4, are idle now, and have not been operated for many years.

It has been stated that one reason for the suspension of work at these mines was the opinion that the coal seam was nearly worked out, and would not justify the company in further prosecution of the business. A new slope had been driven in almost due southeast, directly toward the marginal fault which bounds the coal field on that side. This fault was soon reached by the main entrance, and it is stated as a fact in the vicinity, that soon after reaching the fault the works were stopped, and the mine closed. If this was the sole reason for stopping operations at this place, it is apparent now after examination of the ground, that this seam is yet far from being exhausted, and that fears of its failure were not well founded. There is yet a great extent of ground underlain by this seam wholly unbroken. A fault running N. E. and S. W. divides the area however, and advantage will have to be taken of that in subsequent mining operations. The fault is not believed to be of great depth, and need not very seriously impede work, or increase the cost of development, or of operating the mine.

A large portion of the territory on the southeast side of the vertical seam, has never been prospected over, or carefully searched for coal. Many favorable indications were seen in this rough and generally unsettled section in the few days devoted to its examination. No one has been interested in the discovery of coal seams in that section, at least for many years past. Very little of the land belongs to private owners, and a knowledge of coal seams on Government lands might prevent their being taken up by homestead entry; or if on railroad lands, would inure to the benefit of a corporation that is not generally regarded with favor. Hence no coal seams have been looked for, for many years, and few have ever been discovered except where the out-crops were naturally exposed. Those seams that have been discovered are nearly all on the tributaries of *No Business Creek,* while fully one-half the breadth of the field in this district is not yet known to hold any coal seams. It is therefore confidently believed that there are yet many undiscovered coal seams in this region, and many of those that have been opened are only known in the spot where they were discovered, or its immediate vicinity.

That this is a region capable of producing indefinite quantities of coal is most abundantly shown by the number, and importance of the seams already discovered. Sixteen seams are known, and eight of these are of sufficient volume, or thickness to be mined by tunneling. The smallest one of these eight seams is thicker than the average of the well known "*Black Creek seam*" of the Warrior Coal Field, while the other seven range from *three, feet* to *four feet four inches* thick, and generally of solid coal.

With the "East and West Railroad of Alabama" running as it does through the most productive portion of this region, giving ample facilities for transportation, and a topography that is favorable for building branch roads wherever they are needed for further development, this ought to be a very valuable coal producing region.

In no region heretofore examined is there a better adaptation for mining, or a greater number of productive seams in a given area. And while we have no analysis of any of these coals to present in this report, yet it may be safely said that only coal of the best quality could have obtained the reputation which this coal formerly possessed.

Toward the southwestern side of the Fairview District the seams on the southeast side of the vertical section appear to terminate in the southeast boundary fault, while those of that very productive group lying just north of Fairview Station also pass to the north of Coal City basin. It has been seen heretofore that there is a difference in the strike of these two series of coal seams. The strike of the vertical seam and those connected with it is south 25 degrees west, while the strike of the out-crop of Fairview group is south 45 degrees to 50 degrees west; making with each other a deflection of 20 degrees. This widening space between the two sets of seams is filled up about the line between this section and the Coal City basin with a confused mass of strata, or measures, dipping in different ways, and at different angles, but generally to the southwest, and exposing several coal seams and ledges of rocks that had not been seen elsewhere in the Fairview District. Several of these coal seams are exposed in the railroad cuts between *No Business* and *Broken Arrow Creeks*. None of them are thick enough to be of value, and all of them dipping at very high angles, often 50 degrees to 60 degrees and generally to the southwest, or toward the Coal City basin.

In closing a description of the Fairview section of this Coal Field, the thanks of the Survey are gratefully tendered to H. Chapman, Esq., of Fairview, for his very valuable services, so freely given, in its investigation.

CHAPTER V.

COAL CITY BASIN.

Historical Sketch.

The town and mining region called "Coal City" is located on *Broken Arrow Creek*, in section (1) one, township (16) sixteen, of range (3) three East. About a mile to the southeast in S. 7, T. 16 of Range 4 East is the old town of *Broken Arrow*, which was, previous to the building of the E. & W. R. R. of Ala. the business centre of this section of St. Clair county. The old town still retains most of its population, but the business is now mainly done in the new town of COAL CITY on the railroad.

Coal mining has been carried on in this vicinity, at least occasionally, for nearly fifty years. In 1847 the first State Geologist, MICHAEL TUOMEY, visited this region, and in his First Report on the Geology of Alabama, spoke in terms of high commendation of the Broken Arrow coals. More mining has always been done here than at any other place in the Coosa Coal Field, and the quality of the coal has always been recognized as the best in the State.

The mining in this section was done by private parties, and in a small way, though mostly by tunneling up to 1861. Between 1861 and 1865 much coal was won from this region for the use of the Confederate States' Arsenal at Selma, Ala., it having been considered by officers in control, that the Coosa coal was preferable to any they could obtain for the work there required to be done.

Before the war there had been mining done on three different seams, by three or more different parties. The lowest seam cut is known as the *Hudson seam*, and the works as the Hudson mine. This opening was made in S. 6, T. 16, R. 4 E., on the north side of Broken Arrow Creek, and near the boundary line of the Fairview District. It was judged from the appearance of the old works that the main entrance had been driven in at a right angle with the strike, and that the mine was arranged to be self-draining. If this was successfully done the dip of the seam is southwest, as judged by a cave-in, fifty yards northwest of the entrance of the mine. There is no reliable information at hand of the extent of the mining done here, nor of the size of the seam, or the quality of the coal. The works are now too badly caved to be examined.

The next seam in the series that was opened is the *Gould seam*; this was also opened in Section 6, T. 16, of R. 4 East. It is called the Gould Seam from the name of the man who opened, and operated the mine for many years. When visited in 1893 the entrance to the mine was caved, and the seam could not be seen. Reliable information however classes this as one of the thickest and best seams in the Coal City basin. Reports from parties who have been in this mine vary as to the thickness of the seam, from 4½ to 6 feet. As none placed it below 4½ feet, we place it provisionally at that figure as the safest statement.

At the Gould mine, and between the mouth of the mine and Broken Arrow Creek, the dip of the strata is 7 degrees N. W. The distance from the Gould mine to the old Broken Arrow mine is about half a mile, and the direction is N. W. This dip would put the Gould seam 330 feet below the Broken Arrow seam, at a point due northwest of the Gould opening. But it must be noticed that up the creek above the Gould mine the dip becomes more westerly; the western declination being 12 degrees to 15 degrees showing the descent of the strata towards the centre of the basin west of Coal City.

After the close of the war it was several years before mining operations were again resumed near Broken Arrow. While the Georgia Pacific Rail Road was being built, about the year 1880, there was a demand for coal which was supplied by Mr. D. B. Moore, from a seam which he opened on the south side of the creek opposite the present town of Coal City. This was the first discovery of the seam that is now being extensively mined by the Coal City Mining Company, of which a fuller description will be given hereafter.

About the year 1882 the *Broken Arrow Coal Company* was formed and began operations by sinking a slope on the northeastern out-crop of the *Broken Arrow Coal Seam.* This is a very fine seam of coal, approximating four feet thickness, and of very excellent quality. The company carried on the coal mining business very successfully for several years. They also erected a number of coke ovens very convenient to the mouth of the slope, and so arranged as to be charged by the tram cars direct from the mine, without extra handling or transportation.

The extent of the mining and coking business done by this company cannot be given, as no data concerning their operations have been obtained. That their business was necessarily successful may be safely predicated from the excellence of their arrangements,.and the evident economy of expense. The situation of the seam affords very fine conditions for mining, and the quality of the coal is altogether satisfactory.

In opening out the mine they followed the dip of the seam southwest, with the main entry, until they encountered at an acute angle, *a fault* running about north and south. This terminated their works in that direction. The depth of the fault was then unknown, neither was it known which was the heaved, and which was the thrown side. If any effort was made to find the seam on the other side of the fault it was not successful.

The existence of this fault was a serious impediment to the mining operations of the company. The projected plan of their mine had to be changed to conform to the ground, and their productive area was limited to half their contemplated space. The company became discouraged, and at length operations were suspended, and have never been resumed. When this mine was visited, the mouth of the old slope was so obstructed that a section of the seam could not be seen, nor any sample of its coal obtained for analysis. We are hence without a definite description of this seam, or any data to judge of the comparative merits of its coal.

This property went into the possession of the coal mining company known by the name of the *Eureka Company*. As considerable time had elapsed since work had ceased in the Old Broken Arrow Mine, it was necessarily in bad condition, and would have required much labor and expense to clean and repair it, so that it could be used. Hence this company deemed it better policy to open a new mine than to clean out, repair and probably remodel the old one. They accordingly sunk a slope on a seam lying about sixty feet below the Broken Arrow seam, and which is now called after the name of this company, *The Eureka Seam.*

This is said to be a good seam of coal, from three and a half to four feet thick; its out-crop above water level, offering good conditions for mining, and the quality of the coal being altogether satisfactory. The slope followed down the strike of the seam about a southwest course, till it had reached what was judged a sufficient depth to give the best results of mining and output. The main entry was then run on a level to facilitate work and drainage, curving around from left to right. Probably the basin shape of the measures here was not then understood. Work progressed along this line for some years with very satisfactory results, till the main entry having made the curve of the little basin came out on the surface of the ground, nearly a quarter of a mile from, and about opposite the mouth of the slope. The company was no less astonished than disappointed. No survey of the mine had been made, and no such an outcome was thought of. Inspection soon showed that owing to the basin shape of the measures at that place, the main entry had been run around the curve of the outcrop; that much unnecessary work had been done, and the working capacity of the mine very seriously impaired. It seems that but little more work was done by this company: and this old mine is now wholly abandoned.

The Coal City Mining Company next acquired posesssion of this property, and began operations on a coal seam that was cut in 1880 by D. B. Moore, Esqr. It was already a well known seam, but at Moore's opening dipped south 10 degrees west, at an angle of 28 degrees. Moore's pits were on the south side of Broken Arrow Creek, opposite the present town of Coal City. The company, by the aid of the drill, found the out-crop of the seam at the edge of the bottom land, on the north side of the creek. A slope was sunk there on the seam, the buildings, fixtures, and machinery for a well equipped mining plant were set up, and the company have continuously prosecuted an apparently prosperous business.

Coal Seams and Mining.

The seam now mined at Coal City is called the *Coal City Seam*. It lies higher up in the measures than either of the seams yet mentioned, and about 200 feet above the Broken Arrow Seam. At the mouth of the slope the angle of the dip is 21½ degrees, and its direction south 40 degrees west. This is known as slope No. 1.

At slope No. 2 on the same seam half a mile farther west, the dip is the same, 21½ degrees, but the direction is south 10 degrees west.

From the Moore pits to slope No. 2, a little over half a mile, the seam in its strike shows a curvature of 60 degrees. This curve would indicate a diameter of the basin of about one and a half miles; provided the curve is regular, and uniform, which, however, can not as yet be assumed.

The Coal City Seam is one of very great excellence; coal of good quality, 4 feet thick, solid and easily mined. The roof is very good, but between the roof and the coal is a heavy bed of bituminous shale, about three feet thick, which has to be removed in mining. This augments the labor of mining, and vastly increases the refuse cast on the dump; but it also gives ample space for easy and advantageous working.

Bituminous shale is very often found in connection with coal seams in this coal field, sometimes composing the entire seam without any admixture of coal. In this seam there is a very thick stratum of coal overlaid by a thick seam of the shale. This shale is so rich in bituminous matter that it burns freely, and the extensive dump after being exposed for a time to the decomposing action of nature, developed spontaneous combustion, and has ever since continued to smolder and burn as fresh material is supplied, or as the rain water developes its latent caloric. It is a singular fact that during violent showers, and spells of wet weather, the fire exhibits much more energy than at other times.

Slope No. 1 is a little west of the station, beside the railroad track, and is supplied with all necessary fixtures and appliances for successful working. A large engine lands the loaded tram cars on the tipple and returns the empties to the spot required, clears the mine of water, and runs the fan to give it ventilation.

Slope No. 2 is nearly half a mile farther to the west, with the railroad extended to it also. It is operated in the same way as slope No. 1. Both are under the efficient management of Wm. Herbert, superintendent, and foreman of the mine. No indication of explosive gas has ever been detected in this, or any of the other mines formerly worked near Coal City; nor has any accident to miners ever happened here of which report has been made. This company have sixty coke ovens, capable of producing 150 tons of coke per day. When visited in 1893, the mine was not being worked to its full capacity, and part of the coke ovens were also idle. Only seventy men were employed this year in both slopes, and these worked about two-thirds of the time. The whole product of the mine for the year 1893 was 50,000 tons of coal; the amount of coke produced has not been reported.

The coal of this seam is very uniform in quality, and though not of the highest grade in fixed carbon, yet has many excellent qualities. It is a very free burning coal, finely adapted to steam, grate, or heating purposes; very low in sulphur, and hence dssirable for furnace, forge, or foundry work.

The following analysis of a sample of this coal will show its special features more clearly.

Analysis of a fair sample of Coal City Coal, by DR. J. M. PICKEL, *of the University of Alabama:*

Moisture	1.38%
Volatile Combustible Matter	35.06 "
Fixed Carbon	58.80 "
Ash	5.26 "
	100.00
Coke	63.56 "
Sulphur	0.53 "

In order to show the good qualities of this coal as determined by practical tests, the following testimonials are inserted:

WESTERN & ATLANTIC RAILROAD,
ATLANTA, GA., Feb. 26, 1892.

To Railroad Officials and Others:

This is to certify, that I have been using the Coal City Coal for the past year, for engines on this road, and I can most cheerfully say that the screened coal from these mines is superior to any coal I have used or seen used for steam purposes during my railroad experience of more than twenty-five years.

Respectfully,
J. L. McCollum,
Supt.

Also, the following from the master mechanic of the Nashville, Chattanooga & St. Louis Ry., Feb. 26, 1892:

Coal City Mining Co.:

Sirs—We have been using the coal from your mines for something over a year. I can say that it is the very best steam coal we have ever used. It burns up clean, making very little cinder, and seems to have none of the damaging effects on fire boxes that other coal has. . . It is also a splendid grate coal.

Yours truly,
M. L. Collier,
Master Mechanic.

D. M. Rogers, as General Manager of the *Birmingham and Atlantic Railrood* says: "I consider this coal the best steam coal in Alabama."

This coal has also been highly commended by the Superintendent of the *Alabama Mineral Railroad*; and officials of the *East & West Railroad of Alabama*, and of the *Central Mining Co. of Cartersville, Ga.*, and many others.

The coke made from this coal has also a high reputation. It has been extensively used by the Cherokee Iron Company of Cedartown, Ga., and by the Woodstock Iron Company of Anniston, Ala., and many other parties, all of whom very highly commend it for foundry and furnace work.

The foreman of the Cherokee Iron Company's foundry certifies as follows:

Office Cherokee Iron Company,
Cedartown, Ga., March 22d, 1892.

Coal City Mining Co., Coal City, Ala.:

Dear Sirs—I have had over thirty years' of foundry experience, and have used all the standard cokes of the United States, and I do not hesitate to say that I consider your coke not inferior to the best of them.

Yours truly,
DAN WALKER,
Foreman Cherokee Iron Co.'s Foundry.

This Cherokee Iron Company for their own use, made, or procured to be made, an analysis of this coke, of which they have furnished the following copy:

Water expelled at 212 degs. Fah..	.79
Volatile Combustible Matter.....	.58
Ash..........................	5.61
Fixed Carbon..................	93.02
	100.00
Sulphur included in the above....	.74

From the Woodstock Iron Co. of Anniston, Alabama, there is still more emphatic testimony; the manager, STEPHEN N. NOBLE, says of the coal and coke of Coal City, "They are superior to any coal and coke I have used from any mines in Alabama."

And J. A. DOUGLAS, the founder of furnace No 3, says of the coke, "I would rather have it than any I have ever used. It carries more burden, and stands more blast than any coke I ever used. It is clean and works loose in the furnace, and gives entire satisfaction."

In comparing the foregoing analysis with the analysis of the Ragland Coke made from their washed coal, we note a wonderful similarity. The absolute coke in the Ragland product, as heretofore given, is, Coke—98.80.

In Coal City as above it, is, Coke—98.63.

Or a difference of only .17%

in favor of the Ragland washed coal. And this difference is more than offset by the superior amount of fixed carbon in the Coal City coke.

In prosecuting mining operations in Slope No. 1, the company encountered a north and south fault, the same fault that proved so troublesome in the Broken Arrow mine. This fault evidently passes through the entire basin, severing every coal seam it contains. There is good reason to believe that the fault does not produce a great amount of displacement, yet that amount has never yet been ascertained. There are no apparent data that will enable even an approximate estimate to be made of its depth, and hence we must await the result of drilling, or of sinking test pits to determine this important matter. Instead of doing this, and sinking another slope on the other side of the fault, the company preferred to sink their slope No. 2 on an outcrop of the same seam, about half a mile to the west of Slope No. 1. These slopes both present about the following:

SECTION:

Reddish colored flaggy sandrock.
Bituminous shale, 2 ft, to 3 ft.
COAL, good solid, 4 ft.
Under clay, dark, 2 ft.

In Slope No. 1 the main entry is now run along the side of the fault, which secures economy in working, and prevents the fault from interfering with the plan of the mine. The slope was sunk so near to the fault that this change in direction caused but a slight deflection from its original course, and does not affect its successful operation.

The Herbert Seam.—About 250 yards westward from Slope No. 1 of the Coal City mine, in the bed of Broken Arrow Creek, a coal seam was lately discovered by Wm. Herbert, mine foreman, and hence called the Herbert seam. Though the position of this seam was pointed out by Mr. Herbert, yet at no time when visited, could the seam be examined, owing to the flushed condition of the creek. Of the thickness of this seam there is only the report of parties who had seen it, to be had as evidence. None of these have had a fair opportunity to examine it, surrounded, and overflowed as it is by water, and hence they do not agree as to its size; some calling it six feet thick, others nine. All agree however that it is a very thick seem. And Mr. Herbert's opinion is that it is excellent coal.

This is apparently the first seam below the fourth or upper Conglomerate, and should therefore be the equivalent of the Montevallo seam* of the Cahaba Coal Field, as set forth in Mr. SQUIRE's REPORT on that Field, pages 92 and 93.

To those who have read the report on the "*Blount Mountain Coal Field*" it will be sufficient to say that this seam is the equivalent of the *Phillip*, *Baine* seam or of the *Carnes* seam, one or both.

The Fourth or Upper Conglomerate.—The next rock that is seen above the Herbert seam, is a heavy massive Conglomerate holding large pebbles, many of the pebbles are weathered out, and are scattered over the ground. Wherever they are seen they afford clear evidence of the present or former position of this rock. It is very subject to disintegration, and in many places these large scattered pebbles are the only evidence of its former existence. In some of the botton lands on the southwest side of the creek these pebbles are numerous, and opposite to them in the creek are exposed large masses of this Conglomerate rock. This probably is the base, or near the base of it. Southwest of this point, the bluffs, or creek hills, for over a quarter of a mile, are wholly composed of Conglomerate and quartzitic rocks; their thickness is estimated at 500 feet. At one or two places in this bluff, or hill, rock quarries had been opened, and at many places prospect holes had been dug, all affording good opportunity of seeing the rock, and the composition of its debris, and making certain the identification of this great member of quartzitic and Conglomerate rocks.

The Hammond Seam.—Just above the great mass of quartzitic rocks above described, is a large seam of coal which was opened by *Mr. Hammond*, upwards of thirty years ago, and it is hence named here the *Hammond Seam.* Reports say that much coal was taken out here, mainly by stripping the seam, and the extent of the old works fully confirms the statement.

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*This seam may correspond to the Thompson or Conglomerate seam of the Cahaba Report The Conglomerate may be the same as that which lies in the Cahaba Coa Field between the Helena and Thompson seams. E. A. S

These old pits are near the south line of S. 1, T. 16, R. 3 E. It is said by the old citizens who saw the work being done here, and the coal exposed, that the seam is upwards of *four feet thick*, and that "the coal was of good quality, but softer, and would not bear hauling as well as the coal from the Gould, or Broken Arrow Seams." This is a very reasonable statement. The coal at the outcrop of a seam that is obtained by stripping, could not be expected to be as hard and solid as that won by tunneling. When a tunnel is driven into the hill on this seam the shipping qualities of the coal will be much improved. The fact that this coal has not been dug, for the last thirty years, does not indicate inferiority. The explanation of it is, that the supply of coal from other seams that were more accessible, has, during all that time exceeded the demand in this region that is so prolific of coal.

The strata around, and above the Hammond Seam, are mainly shale, some of it soft, some of it irony and hard, with bands of thin-bedded sandstone occasionally intervening. Another seam of Coal, the top one of the Coal Measures, about two feet thick, comes in southwest of the Hammond pits, and near the tops of the ridges. The dip is still to the southwest, but it is here only five or six degrees, and gradually being reduced.

About a mile beyond the outcrop of the Hammond Seam, to the southwest, is the break, the termination of the basin, the division between the *Coal City* and the *Black Ankle* Coal basins. No evidence of Coal, or Coal Seams was found in this region. It is the top of a watershed, a high divide crossing the coal field between the drainage of Broken Arrow and Wolf Creeks. Whatever the cause producing the break in the Coal Seams, and the severance of these coal basins, the structure has been totally obscured by overlying decomposition products, and no stream, by which this structure might be revealed, cuts this divide.

The space between this break and the outcrop of the upper two foot seam, is the deepest part of the coal measures in the Coosa Coal Field. The upper or Fourth Conglomerate has been seen only here and a little in the basin of Yellow Leaf Creek. It necessarily follows that all the seams belonging to lower levels must lie beneath, and it is probable, almost certain, that a greater thickness of measures exists here than in any other portion of this field, or of either of the other Coal Fields of Alabama. In the Fairview district the estimate of thickness shown was 4650 feet to the top of the First Conglomerate. The thickness of that rock here approximates 500 feet—it is given in at 350 feet in the Cahaba field, it is thicker here, call it 400 feet, and we have in that district 5050 feet of measures. Then in the Coal City basin there are six large seams of coal that are not found in the Fairview district, and apparently come in above the Fairview seams. These six seams represent over 500 feet of strata, but leaving out this 500 feet lest by possibibility it may be the duplication of Fairview strata—then there is the quartzitic group of 500 feet and above it *two hundred feet* of shale and soft rock, carrying two coal seams, making the total thickness of measures here 5750 feet.

It will be noticed by those who have read *Mr. Squire's* "Report on the Cahaba Coal Field," that his estimate of the thickness of the Cahaba coal measures almost precisely agrees with the one just given. The pricipal difference is that this basin has *two hundred feet* of *strata above the Fourth Conglomerate,* or *quartzitic group,* crraying *two seams of coal,* which do not exist in the Cahaba Field. In that field the Montevallo Conglomerate Seam, which lies below the Fourth Conglomerate, and corresponds with the *Herbert Seam,* is practically the top seam, while in this basin it is the third from the top in descending order.*

To those who have read the report on the *Blount Mountain Coal Field* it may be interesting to note the very close agreement of the Upper Seams in that Field and this. There the *Bynum Seam* lying just above the Fourth Conglomerate is *four feet four inches thick;* here the *Hammond Seam* occupying the same position, is upwards of *four feet thick.* The surrounding and overlying strata are the same in both. The upper seam in that field is *two feet* thick, it is the same in this. The only difference apparent is that the intervening strata are thicker in this field, than in that.

Of the seams traced from the Fairview District toward the northwest side of Coal City, the Fairview seam, and the Chapman seam were considered to be identified with reasonable certainty.

They sometimes showed conspicuous outcrops, but yet had not been dug on, or otherwise exposed.

A fine natural out crop about a mile northwest of Coal City, in S. 35, T. 15, of R. 3 East, may have been the seam the out crop of which was seen at New Prospect church, and which lies a little below the Chapman seam. The position of these seams, north and northwest of Coal City, indicates that they dip under all the seams that have been mined on Broken Arrow Creek. In all that space from Backbone Mountain, a distance of five miles, the strata dip toward Coal City. The coal basin lies close to the southeast side of the field, with its centre a little southwest of Coal City. There appears to be no break in the strata from the centre of the basin to the top of Backbone Mountain. The dip in all this space is southeast, near the mountain very steep, and over twenty degrees near Coal City, but less, about fifteen degrees, in the intermediate space.

Thickness of the Measures.—It is usually considered here that the average declination of the measures is fifteen degrees, but should the thickness of the coal strata be calculated upon that angle it would give apparently an unreasonable result. Calculated at ten degrees would show nearly 5,000 feet to Coal City with over 700 feet to be added for the Fourth Conglomerate group which lies beyond. Hence, though calculated at a less angle than obtains on the surface, a greater depth of measures is indicated here than is believed to exist anywhere else in the State.

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*See foot note on a preceding page as to equivalence of the Fourth Conglomerate. E. A. S.

This result was unexpected and surprising, judging from the partial reports heretofore made of this Field. And yet it might have been anticipated, for it is a well known fact that all strata composed of coarse heavy material thicken toward the east, and southeast. Some of them have thickened very fast. The First or Lower Conglomerate, twenty miles north of Coal City, in Blount Mountain, or Chandler Mountain, is given as from 80 to 100 feet thick; here it is at least 400, making such mountains as *Shoal Creek*, and *Backbone*, and it is still thicker farther to the southwest.

The Second Conglomerate which in the "*Plateau Region*" and the *Warrior Field* seldom exceeds 50 to 60 feet in thickness, is here a mountain-making formation, to which the Coosa Coal Field is mainly indebted for its grand topography. And the Fourth or Upper Conglomerate and quartzitic group, which in the "Blount Mountain Coal Field" is 180 feet thick, is here, and in the Cahaba field also, 500 feet thick. The other rocks have probably also thickened in a like proportion, but they are not so patent to observation as the conglomerates and quartzites.

These facts being considered, it is a necessary inference, that the Coosa Field lying farthest eastward, must originally have had thicker measures than any other part of the Alabama Coal Fields. And it is equally evident that this great thickness of strata is still retained, except where the surface has been removed by denudation. It is also evident that a large portion of its surface, perhaps all of it, has been greatly eroded, yet the part lying just southwest of Coal City, holds the newest coal seams, the highest up in the measures, of any that are known southeast of the Warrior Field. Hence the claim that this locality is underlaid by the maximum thickness of Alabama coal measures, seems to be well founded.

Number of Coal Seams.—In a region where coal is so abundant, there has been but little effort put forth for its discovery, and hence the number of large seams existing here cannot yet be definitely stated. No account has been taken of any seam that is not thick enough for successful mining; and there is yet much space unexplored, where undiscovered seams of large volume may exist. Only those seams have been opened which showed some natural exposure, and were easily accessible.

Natural exposures of coal seams are rare, the face of the country is generally covered with a mantle of clay and soil which covers up, and hides the underlying cap rocks, and harder ledges of strata, that in other fields serve to designate the seams. Except where some stream, or deep wash has cut away the surface covering, there is no indication of the underlying coal seams. Hence in much of the region northwest of Coal City, where no streams have cut across the strata, there are no exposures, and as yet no discovery of coal seams, though their existence is highly probable.

Of the four seams that have been mined on the northwest side of the Fairview district, the two middle ones have been certainly traced into the northwest side of the Coal City basin. This gives such a high degree of probility that the others also are there, that they are listed below among the known seams of this basin with assured confidence. In addition, there is the large untested seam, seen in S. 35 as already stated, and judged to be the unopened New Prospect seam. Hence the following is a list of minable coal seams in the Coal City their basin, with respective measurements of coal:

Carson Seam,	3 ft.	3 inches.
New Prospect Seam,	3 ft.	0 "
Chapman Seam,	3 "	6 "
Fairview Seam,	4 "	4 "
Higginbotham Seam,	3 "	0 "
Hudson Seam,	4 "	0 "
Gould Seam,	5 "	0 "
Eureka Seam,	3 "	6 "
Broken Arrow Seam,	3 "	8 "
Coal City Seam,	4 "	0 "
Herbert Seam,	6 "	0 "
Hammond Seam	4 "	4 "

Of these 12 minable seams in this basin, the only doubt existing is as to the New Prospect, which indicates a greater thickness of coal than stated, and the Higginbotham, in which 3 feet is the maximum thickness. There is carried by these seams nearly 50 feet of coal, besides all that exists in that uncounted number of thinner seams. *Ten of these seams have their out-crops within one mile of Coal City depot,* leaving only two yet discovered in the other four miles in breadth of Coal Measures lying nearer the base, and extending northwestward to the Backbone Mountain, and northward to Pine Moutain.

Faults.—The existence of a North and South fault probably cutting through all the seams at Coal City, has already been noticed. There is nothing known of its course, beginning, or ending, except what is shown in the mines where it was encountered. The surface gives no indication of its existence whereby it might be traced. It probably crosses the field in the course indicated, and unites with the great marginal fault between the *Coal City* and the *Black Ankle* basins.

It is only in a few places, in washes and railroad cuts, that a view of the structure near the marginal fault can be had. So far as seen it is a succession of faults and compressed wrinkles involving the edge of the Coal

Measures, and the older formations adjacent. There is hence no regularity in the parts of the measures, and the formation with which they come in contact. This seems to depend on the number, and size of the wrinkles. Near the edge of this basin several small seams of coal were seen, but the horizon to which they belonged could not be determined; sometimes the junction of the Coal Measures and the older formations occurs at the general level of the basin; in other places, one or both of the borders of the field are elevated into a ridge. On the southeast side of Coal City basin, the bordering ridge starts at the edge of the Coal Measures near *No Business Creek*, and runs close to the old town of *Broken Arrow;* from thence it gradually diverges from the Coal Measures, and becomes more prominent. Six miles to the southwest of Old Broken Arrow, near the town of *Eden*, this ridge is from one to two miles from the edge of the Coal field.

In the space of about a mile here, it is evident that by a series of faults, and short folds the Silurian strata have been brought up to a level with the top of the Coal Measures, thus showing a displacement of not less than 8.000, probably 10.000 feet. After all the denudation which the Coosa Valley has suffered, amounting to several thousand feet, this denudation has only in small degree affected the coal bearing strata, and nearly the whole thickness of the measures is here preserved. Assuming the surface of the Coosa Valley here to be 600 feet above tide water, the base of the adjacent Coal Measures must be *at least 4.000 feet below sea level!*

The depth of the boundary fault could not be estimated for want of definite data to determine the horizons that are brought together. We pass in a few steps from some part of the productive Coal Measures, to some part of the Silurian, composed of dark slates and silicious sparry limestone. It is probably Trenton, though no fossils were found. Hence all we certainly know of the depth of this fault is, that it equals the whole thickness of the Coal Measures, and of all the strata intervening between them and the formation that now makes that part of the floor of the Coosa Valley, next adjacent.

CHAPTER VI.

BLACK ANKLE BASIN.

Location and Topographic Features.

About two miles southwest of Coal City there begins a region of country that is very gently undulating, and in many parts nearly level. A closer examination shows that it has not been upturned, or broken up by folds or uplift. The strata lie horizontal over much of the region in its more central parts, and all around the edges they dip inward, apparently to a common centre. It is called the "*Black Ankle Country*."

Approaching this basin from Eden, on the G. P. Rail Road, after passing over or through a ridge of sandy chert, near Wolf Creek, and over two miles of undulating shale we find the irregular edge of the Coal Masures in a high point of Second Conglomerate rock; strata here dipping towards the North. A short distance beyond the Conglomerate is a thin seam of coal overlaid by a thick bed of fossiliferous slate. North of this point the strata are much broken up and formations mixed. In S. 27, T. 16. of R. 3 East a careful examination was made of the formations brought to the surface. Next to the Coal Measures there was Subcarboniferous chert nearly vertical, and smoothly uniting with the top members of the coal series. Next on the south flat woods and other strata of the formations older than the Coal Measures, all dipping at high angles.

As soon as the edge of the Coal Measures was passed the strata were found dipping gently, about 4 degrees, towards the northwest, but no rocks were seen whereby the vertical position in the measures could be identified. A short distance from the edge of the measures there was seen a thin seam of coal overlaid by fossiliferous slate, very similar to the one seen in section 27, and possibly the same, but here there is no conglomerate rock to be seen, and probably the conglomerate in S. 27, had no natural connection with it either. Along this border space, sequence of strata need not be expected, and cannot be inferred.

The great peculiarity of this region is the apparent absence of any evidence of disturbance along the edge of the Coal Measures. The union of the coal strata and the older rocks is under a gently undulating surface that gives no exposures of rocks to mark the transition from the highly tilted older strata to the almost undisturbed Carboniferous.

The high ridge, heretofore referred to as starting near No Business Creek, and running southwest, is about three quarters of a mile southeast of the edge of the Black Ankle Coal Basin, but has no apparant connection with it.

The region known as *Black Ankle* comprises the greater portion of four sections of land, or from 2,000 to 2,500 acres. In this area there are no hills, and only a gentle descent from the surrounding margin towards the centre. The drainage is through one of the head branches of Wolf Creek, which, with many little affluents meander through its extensive flats. This whole region though possessed of a good soil is wholly unoccupied, and uncultivated. For want of definite imformation, the several points of interest could not be certainly located, and are therefore only approximately placed.

Coal Seams.

The old *Black Ankle Coal pits* where a good deal of coal had been dug in former years, by stripping off the surface covering, were supposed to be located about the corner of S. S. 14, & 15, & 22, & 23, T. 16 of Range 3 East. Only a little of the coal could be seen here; it seemed to be of very good quality. All the coal of this region has a high reputation among the local smiths, who regard it as the best shop coal in St. Clair county. It is only roofed in with hard shale, and is but a few feet below the surface. The bed rock, a gray flaggy sandstone, dips here 8 degrees, N. 30 degrees W. About a half a mile farther east, there was another opening, or pit on the same seam, coal soft not roofed in, dip 4 degrees N. 65 degrees W.

About one mile north of the Old Black Ankle pits, the Old "Bibby pits" were found. The coal is here lying beneath hard curly shale, and dipping S. E. 4 degrees. These pits are opposite the Black Ankle pits, and on the other side of the basin. The coal is harder, and apparently better than the Black Ankle coal, though doubtless the same seam. The thickness at both places about the same, 23 inches, rarely two feet. The coal is of the same structure at both places, and only this difference was apparent; at Black Ankle the seam is covered with bituminous shale, but not at the Bibby pits. This would ordinarily be considered a distinctive difference, but here it may have been that the bituminous matter was washed away before the deposition of the earthy matter that made the curly shale, and that the coal and the shale are unconformable. This explanation is the more reasonable as the seam is covered with bituminious shale, more or less thick, at every other place where it has been cut in this basin.

The *Marion Tomason* pits are less than a quarter of a mile south of the Old Bibby pits. More coal has been raised there than at all the other pits in the Black Ankle basin. The pits are all near the little Creek in flat, bottom land. The strata lie perfectly level, at least no declination in any direction was observed, consequently the pits were all about the same depth and had the same covering; they show the following

SECTION :

Surface soil and Clay,	30 to 36	inches.
Shale, and blue Slate,	15	"
Bituminous Shale,	24	"
COAL,	23	"
Under Clay		

The coal is solid, and uniform in quality and texture, hard, bright and glistening, evidently of good quality. No digging for coal has been done in this basin for several years, and no sample of coal could be obtained for analysis. This is regretted, as it is believed from the pieces scattered about, that this coal is of very high grade. But the fact that it is universally commended by the smiths as a first class shop coal is sufficient to establish its grade. A good shop coal is necessarily a high grade coal, a good coal for all purposes: it must coke easily and thoroughly; it must carry a fair amount of volatile combustible matter to be free burning; it must contain a high per centage of fixed carbon, to give the neccessary endurance, and high heating power; it must be low in sulphur or it will corrode the iron and steel, and be otherwise objectionable, and it must make but little ash or clinker, to clog the forge, and hinder the work. Hence the essentials of a good coking, furnace, and steam coal, and a good shop coal are the same. The coal that works well in the forge, will work well anywhere.

About a mile west of the Black Ankle pits, this seam was seen at its out-crop; coal soft and overlaid with soft bituminous shale. The dip at this place was about east, and apparently only four or five degrees. No digging had been done on the west side of the basin, and hence, the quality of the coal and the thickness of the seam could not be seen.

The boundaries of this little basin are tolerably well defined, though not marked anywhere by a high margin. On the southeast side it is a low flat ridge of vertical

Subcarboniferous, or Fort PayneChert, running nearly northeast and southwest; on the other sides its margin is nearly a semicircle, along which the dip inclines in toward the centre, but which is unmarked by any ridge or continuous elevation. This basin differs from all other basins in this field in the gentle inclination of its strata around the margin, and in its being horizontal in the centre. Of course this unbroken uniformity prevents the examination of its contents from any natural exposure. The top seam of coal and the few feet of earth above it, cover the whole basin like a blanket, and hide all that lies beneath.

If the Black Ankle seam could be identified, and its place in the vertical column approximately ascertained, it would throw much light on the underlying contents of this basin. But that has not been done, and it now seems improbable that it can be done. No seam with the characteristics of this one has been seen anywhere else in this field. From the union of bituminous shale with the coal, it is inferred that it belongs in the upper, or productive group where this kind of shale is most common; but the seams of that group are believed to be known and neither of them, nor the associated strata resemble this one.

Wherever the basin structure exists in a coal field, considerable difference in the seams, and contents of different basins, may always be expected to exist. And that difference may be as great between contiguous basins, as between the distant parts of a great coal field. Each basin will require separate study, and critical examination. Deep boring will be necessary to ascertain the contents and structure of this basin, and no portion of this coal field presents a more inviting area to be tested. Should thick seams exist within reach, it would be the most desirable mining locality in the Coosa Coal Field. A branch from the Georgia Pacific Railroad at Eden, between three and four miles long, will reach the middle of the basin, and give a gentle down grade to the main line.

It is earnestly hoped that a test of this basin will be made at an early date, because it is believed that it contains valuable seams of coal which cannot be otherwise exposed. The small amount of rock apparent in and around the basin, gives promise of easy and inexpensive testing. And while the knowledge as yet obtained, is not sufficient to give positive assurance of thick underlying seams, yet all the indications point to that conclusion. The distance of this basin from Backbone Mountain on the northwest, is about the same as the Coal City basin, nearly five miles, and for three miles of that space, southeast of the mountain, the dip of the strata is fully as great to the southeast. This long, and apparently unbroken series of southeast dips, embraces all the lower, and less productive measures, with their characteristic rocks and slates. It is hence inferred that all the strata of the Black Ankle basin come in above these measures, and belong to the upper and most productive series of this coal field; the same series that makes the upper part of the Coal City basin. It is reasonably inferred either that this is the fact, or that a great fault breaks the sequence of strata on the northwest side of the basin, of which there is no evidence seen; and it is further inferred that a great fault there would show plain evidence on the surface which could hardly be overlooked.

On the west side of the basin the country becomes rough and broken, and gradually to the southwest developes into a well defined ridge, that is known locally by the name of *"Wolf-pen Ridge."* Between Wolf-pen Ridge and Backbone Mountain the country is much broken, and deeply eroded by the head streams of *Cane Creek*. Very little coal has yet been found in this region; one or two seams only are known to exist, and they are too thin to be of much value.

On some of the slopes from the Backbone Mountain, and parallel ridges there are fine deposits of sand, which has been washed off from the Conglomerates and overlying rocks. One bed examined at Wm. T. Eppinson's on the Elbow Gap road, in S. 20, T. 16, R. 3 E., was of very good quality for either moulding or building purposes, and would doubtless be in demand if it could reach a market.

Southwest from Eppinson's down the course of Cane Creek, there are several little openings on small seams of coal in sections 20, and 30, T. 16, of. R. 3, East; but none yet found thick enough to be worked with profit. There are, no doubt, other seams not yet seen, which when discovered will make a better showing. At only one place, on the lands of Mr. Carreker in S. 36, T. 16, of R. 2, East, was there any place seen where much effort had been made to find coal. Considerable digging had been done here on a seam in former years; but now the works are all filled up. The coal could not be seen, but those who had intimate knowledge of the seam vouched for its being forty-two inches thick, and the coal is said to be very good. This seam was opened in the bed of a branch which runs into Cane Creek, about a mile northeast of Cook's Springs. It was evident from inspecting the ground that the seam could easily be opened at other places, and tunneled in at right angles with the strike, making the works self draining. The strata here are mainly shale with some soft rock, and dip twenty degrees southeast.

This opening is only a little over a half a mile to the northwest of Wolf-pen ridge, which opposite this section looms up like a mountain. This ridge formed near the edge of Black Ankle basin, in S. 16, or 17, of T. 16, R. 3 East, and for four miles has been increasing in prominence, and effectually dividing this portion of the field into two parts. It has now reached its greatest prominence, and as it is an uplift, as has heretofore been explained, it breaks, or interrupts the sequence of the strata. The rock of Wolf-pen ridge are mainly dark gray micaceous rocks, and apparently younger than the shale and soft sandrock enclosing this coal seam. Other seams very probably exist between this seam and the base of the ridge, but if so they are not in a favorable position to be found, being necessarily covered by debris washed down from the high ridge.

A small seam of coal was cut in making the tunnel through this ridge for the Georgia Pacific Railroad. It was encountered in making the northern approach, and several times in the tunnel on account of faults and slips of strata. In connection with this seam there was a great deal of fossiliferous rock taken out, nearly all of the blue gray micaceous variety, marked with many large and beautiful impressions of fossil plants, mainly *Calamites*, *Equiseta*, and *Lepidodendra*.

In the approach on the north side a very fine stream of sulphuretted water was cut, near the edge of the tunnel, developing a fine spring of most excellent water, that would be highly appreciated if it were more accessible. In the eastern approach, (for the tunnel curves from east to north,) there is acidulated water rising from the floor, and sulphate of alumina, or perhaps alum, exuding as an efflorescence from the floor and sides of the cut. Most likely it all comes from pyritous shale, lying near the surface. This tunnel is in S. 1, T. 17 of R. 2 East; its eastern approach was cut from the head waters, of Canefield Creek and hence it is often called *Canefield Tunnel.*

A seam of coal reported to be three feet four inches thick, was once opened at the side of the railroad about a mile east of the tunnel, in S. W. of N. W. of S. 6. T. 17. R. 3 East. The coal was sought to be used for shop work while the road was being built; but it did not give satisfaction, and the supply of coal had to be brought from Black Ankle. No attempt has since been made to mine or utilize this coal, or to trace the seam to where its quality might be better. The railroad cut close by, and just above where the seam was opened, shows that it is overlaid with a blue gray micaceous bowldery sand rock. This however does not serve to fix its position in the measures, as similar bands of rock are found at different horizons. And in a region contorted as this one, it is not possible to trace an outcrop far, or certainly to identify a stratum unless there is some very notable peculiarity about it. In this region there are different strata of micaceous rock, and often these so closly resemble each other as not to be distinguishable. That this rock is different from the blue rock of the tunnel is evident, but it is like a bowldery rock that is shown in several places on the other side of the ridge near Cook's Springs, which has no coal connected with it, and also like a similar one higher up the ridge which has only a small seam near it, and hence is probably different from this. No further evidence of this seam was found down Canefield Creek.

A little to the northeast of the last opening, and probably a little higher up, a seam of good coal has been opened in the N. W. of the N. E. of S. 5, T. 17, R. 3 E., but it was only 16 inches thick, and hence has not received much attention. Good signs of coal were also seen near Roberts' Mill in S. 5, of T. 17, and in S. 33. of T. 16. R. 3 East, but no openings had been made sufficient to test any of these supposed outcrops of coal seams.

In the region adjacent to Canefield Tunnel it is not probable that much coal will be found. The region has been greatly disturbed and elevated into imposing mountains, with all the slides, faults, and contortions of strata which necessarily result. On the northwest is the great elevation called "*Baldrock Mountain.*"

One or two small seams are known to exist in the branches descending from Baldrock Mountain, and a small seam is exposed in the rail road cut west of Cook's Springs, also another small one south of Cook's Springs on the side of the road leading up Wolf-pen ridge, or Tunnel Hill as it is sometimes called. The only one that is so far known to carry good coal, in sufficient volume to be mined, is the *Carreker Coal Seam* already mentioned, in S. 36, T. 16, of R. 2, E. This seam, if 42 inches thick as reported, at out-crop, could be successfully mined, and should the coal prove as good as alleged, it yet may be the scene of a successful industry.

The opening made on the out-crop of this seam was but little over a half a mile from the Richmond and Danville or Georgia Pacfiic railroad, and less than a mile from the station at Cook's Springs. The construction and equipment of a branch road from the station to the coal seam would not be a formidable undertaking for the railroad, if mining on a liberal scale is assured in good faith. And probably other, and even more favorable positions yet nearer to the rail-road tract may be found, for opening up this coal seam. The out-crop of the seam in a southwest course from the Carreker opening will be found crossing the railroad between Cook's Springs and Cane Creek; and along this line are many places that seem favorable for opening and mining this seam.

Southwest of Cook's Springs the Carreker coal seam may be confidently looked for along the breaks leading into Cane Creek; and gradually curving southwards with the trend - of the ridges, till its out-crop may be found only on the south side of that stream. There were plain evidences of coal seen at several places along this line, some of which were supposed to be of this seam; but in the general absence of surface rocks, which obtains in this Field, it is only by means of excavations at moderate distances that coal seams can be certainly traced over extended spaces. There has not been any persistent effort made to find coal in the broken reigion lying south and southwest of Cook's Springs. The topography was not inviting to the prospector, or the speculator, and no market sought for its supply in that region. It is probable that coal seams exist there as they do elsewhere in this Coal Field, they are as yet generally undiscovered. These remarks apply aspecially to the region lying between the *Georgia Pacific Railroad* and the southeast edge of the Coal Field. And they also substantially apply to that broken region north and northeast of the line of that railroad up to the Black Ankle basin.

In the section of this field through which the G. P. Railroad passes, no effort has yet been made to mine coal for market, or even to search for coal that could be put on the market. The very excellent facilities for transportation afforded by that road for carrying coal to market, are up to this time wholly unused by the Coosa Field. The long trains of coal cars that daily pass over that road loaded for more eastern markets, almost all come from the interior of the Warrior Field, forty to eighty miles farther west. It is confidently believed that this amount of coal could be furnished close to the line of this road in St. Clair County, and obviate the necessity of the long haul from the present source of supply.

In the prospective development of coal mines in the Coosa Field, it is not to be inferred that any competition, or rivalry with the other Alabama Coal Fields will result; but rather that a mutual advantage will arise from the distribution of the out-put of each, to the supply of the nearest markets; and thereby avoiding the cost of all unnecessary transportation. But all this is only prospective, and while the development of the Coosa Coal Field is in abeyance, the coal consumers of east Alabama, and Georgia, will have to pay the increased cost of the longer haul from the more distant mines.

CHAPTER VII.

KELLEY'S CREEK BASIN.

Boundaries and Structure.

A basin structure is very apparent in that depressed area in which *Kelley's Creek* flows across the Coosa Coal Field. From Carr's Gap, where it enters the Coal Measures, its course is southeast, with the dip of the strata, nearly to the mouth of *Cane Creek,* thence south and southwest, as affected by the dip of strata, and declination of surface, till it leaves the Coal Field at *Duyke's Mill.* On the west side of this depression comes in *Shoal Creek,* flowing nearly east, in conformity with the general dip of the strata in that direction, on the west side of the basin. On all sides there is a general dip of strata towards a common centre, and also a very general diminution of the dip, or inclination of strata around this common centre—a basin in form and in fact, yet presenting many little ridges, and wrinkles of strata which mar its regularity of outline. From all this it may be inferred that this region has been a good deal disturbed, and its strata contorted and broken by the forces which elevated the adjacent mountains. Probably its diverse dips of strata are due alone to this cause, including the resultant pressure from the marginal elevations. The middle of this basin is in section twenty, T. 17, of R. 2, East, or nearly half way between Carr's Gap and Duyke's Mill, the former being at the north side of S. 8, and the Mill at the south side of S. 32, of said township. The distance here across the field from north to south is exactly five miles.

At Carr's Gap, the rim of the Coal Measures composed of the First and Second Conglomerates, appears to have been broken, or cut by a fault, which lets Kelley's Creek flow through. The Creek is spanned by the rail road bridge, on the G. P. road, where it passes between the two great Conglomerate plates. The distance between them is less than one hundred feet, which is mainly filled up with dark shale, and some dark, or nearly black slates. The dip of strata nearly uniform seventy degrees to south east.

Going south from Carr's Gap there is but little rock seen by which the dip of the strata could be measured. For two miles nearly all the rocks seen were reddish colored, soft friable sandstone, called here "loam sand," or "loam sandstone." Near the middle of the field there is a bowldery, blue gray micaceous rock seen at several places. This rock is similar to, and apparently identical with the rocks seen at, and about Wolf-pen Ridge, and many other places between here and Trout Creek, also near Henryellen and other places in the Cahaba Coal Field. It appeared to possess the greatest volume in sections 17, and 20, T. 17, R. 2, East. But neither at this place nor at any other yet passed over, does there appear to be any close connection between this rock and any coal seam in this field. It has not been seen lying near to any seam, except that reported on the head waters of Canefield Creek, beside the track of the Georgia Pacific Rail Road, and the seam at the Inman Mines. As already stated there are certainly three bands, or ledges of this rock, and these are all very similar in appearance, and cannot be certainly distinguished, except when occupying the same locality. It is also exceedingly probable that neither of these bands, or ledges of micaceous rock pervades the entire field; that they exist only in certain areas, and are patchy in extent, as well as in structure.

In sections 17, and 20, above referred to, the micaceous rocks are on the dividing hills between Shoal Creek, and Kelley's Creek, and appears to be in line with Wolf-pen

Ridge, and might be taken for its prolongation on the west side of Kelley's Creek, were it not for the fact that that ridge is seen on the east side of the Kelley's Creek basin, trending south, and connecting with the south-east margin of the coal field. All the ridges on that side of Kelley's Creek are deflected southwards, as though there had been a change in the direction of the strike here, from south-west to south. This gave a western dip to the strata, and was one of the factors which produced the Kelley Creek basin. The centre of this basin is in, or about S. 20, T. 17, R. 2, East above referred to. In this region the strata are nearly, or quite horizontal, while all around it the strata dip towards this common centre, gradually diminish in the angle of inclination towards this central region. This basin embraces about twenty to twenty-five square miles, it being about the same distance across it from northeast to southwest as it is across the field from northwest to southeast.

Coal Seams.

In this basin a number of openings have been made on coal Seams in different places, enough to show that it is a good coal-bearing region; but no mining has been done, except to win a little coal here and there for blacksmith's use. One of these seams was cut in digging a well near the centre of the basin, where the strata are nearly horizontal. It was reported to be good coal, and about three feet thick. A sample of the coal was obtained for analysis by decending the well, and chipping off the coal from top to bottom of the seam. It has been several years since this well was dug, and the coal being above water and exposed to the air, must have deteriorated greatly in quality; yet it shows the following analysis:

Moisture	0.88	%
Volatile Combustible Matter	28.03	"
Fixed Carbon	56.88	"
Ash	13.04	"
Sulphur	1.17	"
	100.00	

Or in this form:

Moisture	0.88 %
Volatile Combustible Matter	28.03 "
Coke	71.09 "
	100.00
Ash	13.04
Sulphur	1.17

Dr. J. M. Pickel, *Analyst.*

This well is near the middle of S. 20, T. 17, R. 2 East. Nearly due east from this place in S. 21, same Tp., near Landrum's Old Mill a seam of coal about 3 feet thick was opened many years ago, and worked by stripping to some extent. The coal had a good reputation as a shop coal, and was freely used in the neighborhood. The old diggings are now all filled up, and a sample of this coal could not be obtained. From its position and all its surroundings it was presumed to be the same seam that was cut in the well in Section 20. It is called the *Landrum Seam*, and it is the uppermost seam that is known in this basin.

On a branch leading into Kelley's Creek in Section 28, same Tp. there were found good signs of coal seams at several different levels, and at one place an opening had been made on a coal seam, said to be about 3 feet thick. An attempt was made to re-open this seam and test the quality of its coal, but the quantity of water encountered, together with the steepness of the dip, (northward,) were too great for the means that were at command, and it was not effected. It is probable that two or more seams of coal may be found on this branch; and also crossing the divide on branches running into Shoal Creek in Section 29, same Tp. the coal seam that had been cut here is known as the *Patman Seam*.

A seam of coal about two feet thick is known to exist in Kelley's Creek, a short distance above Duyke's Mill. And two or three other seams are reported as having been opened on a branch which heads nearly opposite the head waters of Canefield Creek, and runs westward into Kelley's Creek. These are probably in S S. 22, & 27 of T. 17, R. 2 East. Coal has also been worked on a seam at Jas. Dunlap's in S. 15, of this Township. Coal is also found in the S. E. ¼ of S. 7, and the S. E. ¼ of S. 32, both of T. 17, R. 2 East. These last two may be the same seam out-cropping on opposite sides of the field; both are down near the base of the Measures, close to the Conglomerate which form the prominent opposite sides of the field.

It is also reported that coal has been found in Section 31, same Township, on the west side of Kelley's Creek; this also is probably the same seam as in S. 32, being in the same geological position.

As the seams in this basin have not been much exploited, and the places where seams were cut are widely separated, it has not been practicable to decide on the number of seams the basin contains. The same seam may have been cut at different places, but not enough exposed at either to be certainly identified. Notwithstanding the uncertainities thus involved it is believed that three or four different seams exist here, that are of recognized value. There has been but very little demand for coal in this region, hence very little effort has been made for its discovery.

Although this basin is traversed by Kelley's Creek, and Shoal Creek, and the many branches that run into them, yet as the strata in the main part of the basin lie nearly level, it has not been deeply eroded by the streams, and there is hence no great depth of the Measures exposed. It is in consequence of this, that so little is known of the coal seams in this basin. The indications all point to a considerable depth of productive Coal Measures here, and to a structure that would be very favorable for mining; but the drill must be applied freely, before all this can be certainly known.

In a western course from Kelley's Creek the edge of the basin is about the Range line between Ranges 1 & 2 East, and Township 17 South. The strata show disturbance along a ridge trending nearly north and south, or toward Coosa Mountain, which runs about east and west from its upper end to the C &. W. R. R. tunnel.

About the Range line between Ranges 1 & 2 East, a series of broad, ridges begin which cover most of the country from Shoal Creek to Big Oak Mountain, and extend several miles west of the Columbus and Western railroad. These ridges are mainly composed of a soft, friable, reddish colored, or spotted sandstone, called here "*loam sandstone.*" The name seems to be very appropriate, as the rock disentegrates into sand, or loam, wherever it is exposed. It is here the country rock for many square miles. It is more abundant here than any where else in the Coosa Coal Field, though some of it has been seen in almost every locality, though never anywhere in connection with coal seams, or where its position in the geological column could be certainly determined, except in the Yellow Leaf Basin.

Attention was first directed to this rock at the quarry on Coosa river at Lock No. 2, and from whence the rock came to form the parapet, or riprap of Lock No. 3. The reddish colored sandrock at this quarry is filled with aluminous specks of a bluish color, which gives it a pisolitic appearance and structure, very strongly suggestive of arenaceous bauxite. This rock cannot be far above the Second Conglomerate at the Coosa river, and may hold the same postion here; but it is also probable that rocks of this structure, and appearance, may occupy different positions in the vertical scale in this Field.

In this wide region of loam sandstone, north, northeast and southwest of Dunavant, very little coal is known to exist. A little seam about three inches thick lying just below the great interconglomerate slate bed, as exposed in the "*little tunnel*" through Big Oak Mountain, and a small seam in a like position in the "*big tunnel*" through Coosa Mountain, a thin seam about fifteen inches thick on a branch running into Shoal Creek just above the town of Dunavant, and a seam of twelve inches thick, on, or near the top of Coosa Mountain, are all the coal exposures known in Township 18 of Ranges 1 east, and part of 1 west. There is hence a space here of over thirty square miles, extending from the range line between ranges one and two east, to the divide between the waters of Shoal Creek and Yellow Leaf, that so far as known, is destitute of any coal of minable thickness or quantity.

The same rock is found in small quantity farther to the southwest in the Howard, and in the Yellow Leaf basins, but the amounts there are too small to decide if they belong to the same horizon, with the great *Dunavant "loam sandstone formation."* *

This region crossed by the Columbus and Western railroad, is the narrowest section of the Coosa Coal Field. This arises from the western trend of the Coosa Mountain, which makes its southern side, from its eastern end near the mouth of the Shelby county *Shoal Creek*, and between that and *Vandiver*. As the *Big Oak Mountain* maintains its due southwestern course over this space it is evident that the borders of the field for the last six miles have been converging, and are here only two miles apart. A short distance west of the big tunnel the trend of the mountain becomes nearly southwest, and opposite the head of Shoal Creek this section of the field has perceptibly widened. The description of the Kelley Creek basin has been extended to cover all that section which is drained into Kelley's Creek, although for the greater part of the area drained by Shoal Creek, there is no semblance of a basin structure; yet because of its drainage relations to that basin, this seemed the most appropriate place for its consideration.

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*From later examinations it appears very probable that this "loam sandstone" along the whole course of Shoal Creek, past Dunavant on the C. & W. R. R., and on towards the Howard Basin, has the position above suspected, i. e., not far above the Second Conglomerate, and this would explain the absence of valuable coal seams within most of the region of its occurrence as surface rock.—E. A. S.

CHAPTER VIII.

THE HOWARD BASIN.

Location and Topography.

From a low divide between the head waters of Shoal Creek, and of the North Fork of Yellow Leaf Creek, near the north line of township 19, of range one West, and between *Coosa Mountain* on the southeast, and *Big Oak Mountain* on the northwest, as far down as *Jackson's Gap*, is the coal area designated here as *The Howard Basin*. It seemed proper to designate this basin as the "*Howard*," that being the name of the oldest inhabitant, and most prominent land owner in that region. The basin structure is well marked here, and would be noticed by any close observer in crossing from one side to the other. The dip of the strata from *Oak Mountain* is south-east, and from *Coosa Mountain* it is northwest; both are steep for a short distance, but gradually diminish, and in half a mile from the base of each, the strata are almost or entirely level.

A small anticlinal heretofore noticed, that extends the whole length of Coosa Mountain, at or near, its northwest base, does not materially change or modify this condition, except perhaps to extend the northwest dip a little farther in that direction than it otherwise would have reached.

For a space of a mile, to a mile and a half in breadth, and about midway between the mountains, the surface is level or gently undulating. The whole breadth of the basin is about three miles at its widest part, but lessening toward the southwest end where it closes up by a junction of its bordering mountains. Its length is about eight miles, and its area close to twenty square miles.

It will be thus seen that the structure is very eminently fitted for mining, and equally well adapted to agriculture, both on account of the lay of the land, and the fertility of the soil. The declination of the surface of this basin towards the southwest is very gentle as shown by the fall of the stream which is just sufficient to carry off its waters. From all this it may be safely inferred, that the same coal bearing strata extend all over this basin, and that each one of its coal seams crops out near to the edge of the mountains where the steep dips exist, and extend from thence all over the basin.

Coal Seams.

On the lands of Wm. Howard in the N. E. ¼ of S. 3, T. 19, R. 1 West, a seam of coal thirty-two inches thick at the out-crop was opened by Mr. Howard, and a small amount of coal taken out for use in the blacksmith shop. It was found to be good shop coal, coking and working satisfactorily. The seam has not yet been cut far enough to get under a cap-rock, or probably to develop its full thickness. The opening was made just on the west of the little anticlinal ridge near the base of Coosa Mountain, and the dip of the seam there is nearly west, 40 degrees. In a short distance the strata flatten down to 10 degrees, and in 250 yards from the out-crop, they are horizontal.

This seam was traced to the westward for a considerable distance, by its close connection with the anticlinal, and it was considered to be fairly identified. It was partly opened also in S. 10, of the same Township, but not enough to reveal either its thickness or quality. From the conformation of the region it seems certain that this seam extends throughout the basin. It is the lowest seam in the series of which there is any evidence of out-crop.

Along the line of the C. &. W. railroad between Dunavant and this anticlinal there was seen a sudden downward curve or flexure of the strata, of probably a half a mile breadth. The low valley of Shoal Creek lies next to this flexure towards the southeast, and the structure is consequently entirely hidden for nearly half a mile; but it seems very probable that in this distance we have a closely folded synclinal which may hold a considerable thickness of Coal Measures, and similar conditions may hold throughout the Howard Basin.

This folding of the strata is here mentioned as a possible explanation of the seemingly anomalous proximity of the Howard Seam to the Second Conglomerate; and of the further fact that the slates and shales of this basin, though not identified, yet seem to belong higher up in the Measures than their apparent distance from the Conglomerate would seem to indicate.

The Howard seam is one of a group of seams, consisting of three or more, all lying close together, but as yet only very partially exposed. Their out-crops were seen only near to, or in the bed of a branch which crosses their strike, and the amount of water accumulating in the pits prevented any further penetration of the Howard seam.

About thirty steps down the branch west of the Howard pits, the out-crop of a seam of coal was found in the branch. Beneath a little streak of coal was bituminous shale, and fossiliferous slates. These were dug into to the depth of eight feet, when the inflow of water became so great the work had to be abandoned. That a seam of coal exists here seems evident, and the indications were considered very promising for its being a good seam.

About thirty or forty steps farther westward another fossiliferous belt was found, and good signs of a good seam were presented, but it was not practicable to expose it. In this region as in most others in this field, the coal seams are very much decomposed at the surface, and give no indication of underlying coal by cap rocks, color, or fossils. It is only at the crossing of streams, or recently formed deep gullies, that accidental exposures of coal seams may be looked for. Usually in digging down on a coal seam several feet of subsoil have to be removed before the color of decomposed coal is seen.

There has been no demand for coal in this region beyond a few bushels to do some jobs of shop work on the farm. No public blacksmith-shop has existed there, and for use in the domestic shops, charcoal was always available, and easily procured. Hence, in the absence of a demand there have been no persistent efforts to find a supply of coal, and the structure of the basin tends to hide, rather than expose the seams. Only enough of the out-crops, and indications of coal seams, have been seen to give a strong assurance of its prospective value as a mining region. The drill however, must be relied on to test the ground, and reveal its actual capabilities.

Towards its southwest end, this basin becomes gradually more narrow, and is closed up by an apparent junction of Oak Mountain with the spurs of Coosa Mountain, in Section 30, T. 19, of R. 1 West. At this point there is a combination of mountain uplifts, and ridges that exhibit much confusion. The anticlinal that has flanked the northwest base of Coosa Mountain throughout its whole extent, also disappears at this point. There is also a change near this place in the strike or trend of *Big Oak Mountain*, amounting to fifteen degrees. For many miles its trend has been due southwest, or S. 45 degrees West; now this trend culminates in a high point, 300 feet above its usual height, in S. 25, T. 19, of R. 2 West; below this high point, but in the same section, it is cut through to its base by *Jackson's Gap*, and from thence its trend is South 60 degrees West to its termination in S. 18, T. 20, of Range 2 West, near the town of Pelham.

For a further description of this basin, and the topography of this region, the reader is referred to Chapter II, and the accompaning section, from Big Oak Mountain to Pine Mountain.

CHAPTER IX.

THE PEAVINE CREEK SECTION.

Location and Structure.

Southwest of the Howard Basin there is a very great change in the geological structure of the field. From Jackson's Gap in Big Oak Mountain, and the gap called the "Big Narrows" through Double Mountain, to the southwestern end of the field, the structure is wholly monoclinal, with the strata all dipping to the southeast. The Coosa Mountain, with its conglomerate rocks, and dark slates, has disappeared, except as a leading, or central ridge in a series of ridges that like a succession of wrinkles extend the whole length of this section.

The anticlinal that flanked the Coosa Mountain throughout its whole length has disappeared also, and the only variation in the dip of the strata now is seen in the rocky ridges which generally show an increased inclination. At least such is the appearance they present; but this may arise, at least in part, from the better exposure of the rocks of which they are largely composed.

For four miles southwest of the "*Big Narrows*" the drainage is into one of the head branches of *Yellow Leaf Creek*, except a little that flows out through Jackson's Gap into the Cahaba Valley. From a low divide lying north of the "*Little Narrows*," and extending toward Jackson's Gap, the drainage is wholly into *Peavine Creek*. Both of these streams run close to the base of *Double Mountain*, and near to the great fault which severs the Coal Field the whole length of Double Mountain. This fault has been referred to heretofore in the description of the topography of this Coal Field, but now requires additional consideration.

It is a thrust fault by which the measures are all severed, and the base rocks, the Conglomerates which make *Big Oak Mountain*, are thrust up on its southeast side, making *Double Mountain.* If there is any sinking, or down throw of strata on the northwest side of the fault, it is not apparent. *Double Mountain* is the equivalent, and duplicate of *Big Oak Mountain*; both have the same strike or trend, about the same height or elevation, the same dip, and composed of the same great mountain making rocks, the First and Second Conglomerates.

The fact that a depression running between the two tops of the mountain, is a more conspicuous feature in one of these mountains than in the other, does not militate against this proposition. This depression arises from the abrasion and washing out of the softer material, the slates and shales of the interconglomerate Coal Measures; these are thicker in some places than in others, and when removed show a proportionate space between the two great Conglomerate plates. The gaps in the Double Mountain facilitated the removal of this soft material, which the absence or want of gaps in Big Oak Mountain tended to preserve; hence the main difference in their contour. It may also be that the strata in Big Oak Mountain were more compressed by the force of the Cahaba Valley uplift, than those of the Double Mountain.

The amount of displacement by this fault is not very great; it amounts to the whole thickness of the Coal Measures, plus the height of the Double Mountain. The thickness of the measures here cannot be certainly approximated. This whole section of the field is a monocline about two miles broad, with strata at the surface dipping 30 degrees to 70 degrees to the southeast, but the dips probably all diminish with depth, and curve toward the horizontal, hence no reliable calculation can be made on these data.

This fault appears to increase in depth toward the southwest end of the field, and apparently it is joined by another fault coming in from the north, or northwest, and near this junction say in Section 20, T. 20, of Range 2 West, some hard Subconglomerate rocks, and Sub-carboniferous shales and slates are brought to the surface. The junction of these faults could not be seen, nor the line of the cross fault be very certainly decided on, as both are in the low denuded valley of Peavine Creek. Only the change in the formation is visible, which makes a scallop of the upper members of the Subcarboniferous, of a V shape which terminates the coal field at this end of this northwest section.

About a mile to the northwest of the supposed junction of these faults in Section 19, of this Township, very clear evidence of the existence, though not of the exact location, of this cross fault is presented. On the road leading towards Pelham, after passing over undoubted Coal Measures containing good signs of coal, the road winds up a high ridge the east side of which appears to be composed of mixed material of uncertain clasification, but toward the top are Sub-conglomerate strata, or Oxmoor sandstone. Not a vestige of the great Conglomerates comes to the surface; their place has been passed over, and they are not in it; they have been faulted downwards, engulfed somewhere on the eastern side of the ridge; and the mixed material is the result of, and the debris from, the fault. This place is seen to be directly in line with the end of Big Oak Mountain, and the point of supposed junction of this fault with the Double Mountain fault. It is hence inferred that a cross fault of very considerable magnitude, running northwest and southeast, has cut off the Coal Measures, and engulfed the Conglomerates along this line. It is at least evident that the Coal Measures of the *Peavine Section* are cut off and terminated here. It is further evident that from this line westward, all the underlying formations are found in regular consecutive order. At the western foot of this Sub-conglomerate ridge, the *dark slates* of the *Sub-carboniferous formation* are well exposed, and very much contorted; these are succeeded by the *Fort Payne Cherts* in large volume, with their numerous characteristic fossils, and reddish irony sand rocks, probably representing the Clinton; these are followed by the *Trenton or Pelham limestone* in very great volume, and beyond this the *Knox Dolomite*, and then the *Cambrian*. In all this vast exposure of the strata, and formations, there is no break in the sequence, except the absence of the Conglomerates, and probably other base rocks of the Coal Measures, at the fault which makes the southwest boundary of this part of the coal field. This fault as before stated appears to run from northwest to southeast, about the middle of section 19, T. 20, of Range 2, West.

Coal Seams.

This *Peavine Section* is about ten miles long, by two miles wide, containing about twenty square miles of area, which is believed to be generally productive Coal Measures. Of its productiveness however we have as yet but little knowledge. No mining has yet been done in this section, but few out-crops of coal have been seen, and very little effort has been made to find the seams. On the head branch of Peavine Creek, in the northeast corner of section 10, T. 20, R. 2, West, there was a slight exposure of coal in the bed of the branch. A little digging there, and the deeper washing out of the branch, exposed a fine seam of coal, which on testing gave reasonably good satisfaction as a shop coal. This exposure was on lands owned by Mr. Cunningham and it is hence called the *Cunningham seam.*

To test the thickness and structure of the seam, which could not be satisfactorily done in the bed of the branch, an opening was made on the seam, in the side of the hill about twenty steps from the branch. This opening shows the following:

SECTION,

Reddish colored sand rock	30	feet
Hard arenaceous shale	5	"
Coal, solid, compact,	5½	"
Under clay, dark,	—	

Farther penetration into the hill will doubtless show the arenaceous shale replaced by sandstone, as a cap rock to the coal, or if not entirely replaced, at least very much reduced in volume. Dip of seam at opening southeast, sixty degrees. This opening is on the northwest side of the ridge, and the exposed rocks down the branch, and in the end of the ridge toward the southeast side, show a curve upward, or a lessening of the dip toward the southeast. It is hence believed that this seam could be sucessfully mined notwithstanding the very high dip of its out-crop. Sufficient evidence is already seen to make it certain that the dip of the strata diminishes with depth. In all the mines seen in this field, and all the great exposures across the strike of rocky ledges, this has been the rule, and it is evident from what has been seen here, that this region is not an exception.

This coal seam has a very peculiar structure; it is massive and compact, without any partings, joints, or cleavage planes, and of course mines out in irregularly shaped masses. In all these particulars it resembles the great *Coalville seam*, hereafter to be described, lying on the southeast side of Double Mountain, but unlike any other seam yet examined. That this seam will thicken as it is penetrated beyond the influence of the atmosphere, and other agents of decay, is probable, and it may even approximate the magnitude of the great Coalville seam, of which it now appears to be the counterpart. The resemblance is very striking in the thickness of out-crop, the appearance and structure of the coal, and also in chemical composition.

An analysis of the outcrop of the Cunningham seam, by *Dr. J. M. Pickel* of the *School of Chemistry, University of Alabama,* gave the following results:

Moisture,	0.52 %
Volatile matter,	28.24 "
Coke,	71.24 "
	100.00 "
Ash,	14.25 "
Sulphur,	4.58 "

or

Water,	0.52 "
Volatile matter,	28.24 "
Fixed Carbon,	52.41 "
Ash,	14.25 "
Sulphur,	4.58 "
	100.00 "

This analysis shows that this coal is a dry, and consequently free burning coal, yet contains too much ash and sulphur, as out-crops generally do; much improvement may be expected of this coal in these and other constituents, with deeper penetration of the seam.

The outcrop of this seam is on the northwest side of the first of the series of ridges that run through this section heretofore described. Its outcrop is said to be seen at other places farther to the northwest. Plain evidence of it was also seen near the bed of a branch in section 16 of this township. From the structure of the region, as far as could be observed, the opinion seems fully warranted that this, and the underlying seams, extend beneath the whole valley of Peavine Creek, to the Double Mountain fault, and as far down as the field extends.

In the northeast corner of section ten, and forty-five feet north of the opening on the Cunningham seam, there is another coal seam, which is not named. Its out-crop is also seen in the branch. An effort was made to expose it, but the water prevented its satisfactory accomplishment. Coal one foot thick followed by a thick bed of fossiliferous shale, was all that was clearly made out; but the breadth of the outcrop, to the under clay was over six feet, and the existence of a bed of coal beneath the shale was reasonably expected.

A little over a quarter of a mile north of the Cunningham opening, in section three, of the same township, the indications of a coal seam were observed. The signs were so plain and numerous that no doubt was felt of this being on the line of the out-crop of a coal seam. This is immediately on the northwest side of the main ridge which runs through this region, the extension of the Coosa Mountain uplift, to which attention has heretofore been called. As this is evidently a region abounding in coal, it was much regretted that the seams could not be exposed; but it is sparsely populated, the dwellings few and far between, affording neither hands to work, suitable tools, nor means of accommodation; hence the attempt to expose them was clearly impracticable.

Whether these seams are equivalents of the seams in the *Howard basin* must be left undetermined. The distance between them, and the great diffierence in the structure of the two regions, make it impossible to trace the seams from one to the other. Neither are the rocks, and other surroundings of either, sufficiently exposed for their identification. Yet the middle seam lying so close to the *Cunningham*, with its coal underlaid with much fossiliferous shale, is strongly suggestive of identity with the second seam in the Howard basin, with its bituminous shale above, and a great thickness of similar fossiliferous shale beneath. If these were considered sufficient evidences of idenity for that seam, then the small difference in the distance between it and the seam above, in the two regions, while unimportant in itself, would rather strengthen the conclusion. But then if the *Howard Seam* be assumed as the equivalent of the *Cunningham*, it must also be assumed, that it has changed greatly in the character of its coal, and vastly increased in size toward the south and southwest. While it is now apparent that this is a good coal-bearing area, yet very few discoveries of coal have yet been made. Only a very limited local demand for it has existed, and consequently no efforts have been made to find it. The out-crops of the seams are usually deeply covered, and their positions not easily found even by experts, while by the untrained coal hunter they could only be discovered by accident. Prospectors have been deterred from operating here by the general opinion heretofore entertained, that part at least, of this area is Sub-carboniferous, and not coal bearing strata.

Hereafter with a fuller knowledge of the structure of this region, and stimulated by increasing demands for coal, it is confidently believed that in this region the intelligent and persistent efforts to find coal seams will be abundantly rewarded.

Should the great Cunningham seam on further testing prove as important and valuable as its out-crop now gives promise, it will be of very great commercial value; and, should there be no other minable seam in this region, would fully justify the building of a branch railroad to carry off its output. It could be easily reached by a branch from the L. & N., starting at *Pelham*, and running by an easy grade up the valley of Peavine Creek; distance from seven to nine miles, according to the terminal point. Or a shorter, and more direct route, could be had from near *Siluria*, down the Johnson Branch, near to its junction with Peavine Creek, thence up that to any desired point in this Section of the Coal Field.

For a further exposition of this region, reference may be had to the Section across this part of the field, and the Chapter on the Topography of the Coosa Coal Field.

CHAPTER X.

THE YELLOW LEAF DISTRICT.

The Basin occupies the southeast corner of the Coosa Coal Field. Its boundaries have been described in CHAPTER II on the TOPOGRAPHY OF THE FIELD, and need not be, except incidentally, repeated.

For greater compactness of description however, all that region lying southeast of Double Mountain, and drained into Yellow Leaf Creek, is embraced in this Chapter. This includes the *Penitentiary region*, as well as the distinctly defined *Yellow Leaf Basin*.

THE PENITENTIARY REGION.

In the Penitentiary region as has been previously stated, there is a very considerable thickness of the *interconglomerate* Coal Measures, or the strata that lie between the First and Second Conglomerates. They are about as thick here, and in places thicker, than in the Fairview district, and other places in the northeast portion of the Field.

A mountain called *Oak Mountain* composed mainly of the Lower or First Conglomerate, takes the place of the northwestern limb of Double Mountain, while its southeastern limb is represented by *Pine Mountain*. Between them there is in some places a very considerable space, in others very little; this space is caused by the varying thickness of the interconglomerate Coal Measures.* Wherever there is much space between these mountains a coal seam may be expected to exist; possibly in places there may be more than one, but as yet only one has been found. It lies close to the foot of Oak Mountain, or from 50 to 100 feet above the First Conglomerate. The farthest to the northeast that this seam has been is in the bed of the *Muddy Fork* of Yellow Leaf Creek, in the Johnson Bottoms near the east line of section 34, in the N. E. ¼, or possibly in the N. W. ¼ of S. 35, T. 18, of R. 1 East. The coal had not been dug into, but showed for about a rod in the bed and bank of the creek. It was merely the out-crop from which the quality of the coal could not be judged, the top seemed to be bituminous shale, but beneath that there was apparently about four feet of coal, the bed dipping gently to the south. Should this coal on being tested prove to be of good quality, (as interconglomerate coal generally is,) its situation for mining is as good as could be desired. Its out-crop is in an extensive tract of level land suitable for the location of a large mining and coking plant. It is between three and four miles from the Columbus & Western railroad at Sterrett's Station, to which point there is a tolerably direct and very practical route for a branch railroad, which could be extended up the creek to other locations where it is known that good coal exists.

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*Probably in part also by their undulations.—E. A. S.

This seam was again seen farther up the creek, just below the site of Dykes' or Duykes' old mill in S. 34, T. 18, R. 1 East, and probably near the west side of the section. Only a little of it was seen in the bed of the creek, but its trend and position showed it to be the same seam that out-crops at the creek in the Johnson Bottoms.

The same seam was seen farther up the creek, near N. W. corner of S. 4, T. 19, of Range 1 East, in a gorge coming down from the mountain, and about fifty feet above the First Conglomerate. It was discovered, and opened many years ago by Mr. Stracener, and hence known as the *Stracener coal bed.* But little of it could be seen as the pit is nearly filled up by the wash down the gorge, but enough to show that it is good coal, unusually good for an out-crop. The strike, or trend of the seam, is nearly northeast and southwest, with a southeasterly dip of about seventy degrees. The seam is said to be three feet ten inches thick.

That many other exposures of coal could be made along this creek, and still farther up in the wide coves called the *Penitentiary* and the *Lost Lands* is almost certain; but in this wild and unsettled region it was not practicable to make an exploration, or even to give these mountain-bounded coves a cursory examination.

The mountains in these parts trend in many directions, east and west, and north and south, or curving to the northeast. The U. S. Topographical Map of this region is very faulty in many respects, and from the complication of the structure it could hardly be expected to be otherwise: *Laurel point* is substituted for *Signal Mountain: Pine Mountain* is given the place of what is locally known as *Sand Mountain. Pine Mountain* lies farther south, and extends north of the township line between 18, and 19; and the Muddy Fork of Yellow Leaf Creek runs round its northern end; about two miles farther north than it is placed on the map. The Johnson Bottoms and the coal seam there are on that creek, near the north line of sections 34, and 35, T. 18, of R. 1 E., as heretofore stated.

Southwest of the "*Lost Lands*" the formation becomes more regular, the two lobes of Double Mountain better defined, and the space between them greatly diminished. Apparently the interconglomerate measures are very much reduced in volume, and toward the Big Narrows where they have been washed out, leave merely a gorge between the two Conglomerates. No coal has been found here, and probably none exists in this space.

On the southeast side of Double Mountain a stream descends from the Lost Lands near the base of the mountain, which it has denuded, exposing a thick bed, or stratum of dark shales, lying just above the Second Conglomerate rock, which some people have supposed gave indications of coal, and in which some pits have been dug in the vain hope of finding it. In one of these on the east side of Yellow Leaf Creek, just below where it runs through the rugged gorge of Double Mountain, on the lands of Jesse Nevans, in the S. E. ¼ of the S. W. ¼ of S. 27, T. 19, of R. 1 West, it had been positively asserted that the out-crop of a coal seam nearly fifty inches thick was shown, and that another seam of clean coal two and a half to three feet thick lay fifteen feet below it, cropping out higher up the mountain. The place was very carefully examined, the pit cleaned out, sunk deeper, and samples of the material taken out. It contained nothing but alternate streaks of soft and hard shale, dipping eighty to eighty-five degrees to the southeast It showed no coal, no roofing slates, no under clay, no fossils, nothing, in its body or surroundings, to indicate a coal seam. And as no indication of the out-crop of the supposed underlying seam was visible, and no digging near that had been done to expose it, Mr. Nevans was interviewed on the subject. He stated in substance that he knew of no such seam, nor of any coal seam on his lands, or on lands adjoining, that no digging had been done to his knowledge on, or around his place, except the pit already referred to above.

It is deemed proper to correct the mistake about these mythical coal seams, which uncontradicted might be misleading, and to make it known that immediately above the Second Conglomerate is not generally a coal-bearing horizon. It is also well to emphasize the fact that reports of coal seams, except from experts, are generally exaggerated, and should always be verified by inspection.

THE YELLOW LEAF BASIN PROPER.

Boundaries and Topographic Features.

The *Yellow Leaf Basin*, properly so called lies between the *Double Movntain* an the northwest, and *Salster* and

Burget Mountains on the southeast. It is a very regular, and well defined synclinal. At the northeast end it is divided for a short distance by the southwest end of *Pine Mountain*, and at the southwest end, while the strata mainly dip to the northeast, the symmetry is broken by spurs from the southwest bordering mountain. It is about four miles wide from base to base of the mountains, and over twelve miles long, containing an area of over forty square miles of coal lands.

Crossing the strike southeast from *Double Mountain*, there is seen the following contour and succession of strata; first, four ridges about equal distances apart, and running parallel with the mountain. The most prominent of these are the second, called *Wolf Ridge* and the third, called *Straight Ridge*, the latter is the most persistent, and extends with nearly uniform height the whole length of the basin. They are partially duplicated in reverse order on the southeast side of the field. The distance across the four ridges is about one mile; and the dip of their strata is thirty-five degrees to forty-five degrees to the southeast; they show no duplication of strata, nor has there been seen any evidence of faulting in this basin.

In the general absence of rock exposures it is impossible to give an accurate succession of strata in the remainder of this basin; a near approximation to it is, from *Straight Ridge* southeast, soft reddish gray sandrock, not solid, and soft shale, one-quarter mile; harder shales, loam sandstone, and soft reddish spotted sandstone, 200 feet; blue bowldery hard sand rock, fifteen feet; reddish spotted sandstone, and loam sandstone, 300 feet; harder yellowish gray sandstone, and thin sandy shales, 400 feet; blue hard sandrock, twenty feet; fine grained sandstone and shales, one-quarter mile—strata still dipping southeast twenty-five to thirty degrees. Next a belt of purple shales, fifty feet, blue sandrock, massive, fifteen feet, dark brown to bluish gray shales, thirty-five feet; soft gray slates and shales with some thin-bedded sandstones, one-quarter mile; then the quartzitic group, coarse irony Conglomerate much decomposed, and the surface thickly strewn with pebbles of large size, from the disintegrated *Upper Conglomerate* of this field which may be the *Helena* Conglomerate or possibly the *Montevallo;* strata nearly horizontal. This Conglomerate is mainly shown about the centre of the basin in S. 13, T. 20, R. 2 West. Whole distance from *Double Mountain* to the centre of the basin, or the middle of the synclinal, a little over two miles.

On the southeast side of the synclinal, there is a similarity in the contour, and doubtless an identity in the succession of strata. The distance to the southeast terminal fault is about two miles, with the strata all dipping to the northwest, and with similar inclination with the corresponding strata on the northwest side. It is evident that the strata are not broken, but bent or curved downwards, and that the base rocks which make *Double Mountain* underlie the basin, and come up again in a reverse order, and with reversed dip, forming *Locust Ridge, or Salster Mountain* and *Burget Mountain.*

The depth of the measures at the centre of this basin cannot be certainly known now, and probably never will be. They are too thick to be bored through and their depth measured by the drill hole. There are no deep excavations, or natural exposures affording data for making estimates, and a calculation based on the dip of the strata at the surface, with reasonable allowance for underground curvature, would show a depth of measures apparently unreasonable. Thus, taking the surface dip on either side of the synclinal, at ten degrees less than the average, it gives a depth of measures approximating 6,000 feet above the millstone grit, or First Conglomerate. In thickness of strata this exceeds any portion of the Coosa field, except the region near Coal City in St. Clair county, which has from 300 to 400 feet more of the upper Conglomerate series than exists here. Yet as the measures in this basin contain several bands of strata not seen there, their volume is probably augmented thereby to the full complement of the Coal City basin.

It should not excite surprise, or incredulity, if parts of the Coosa Coal Field hold an excessive thickness of strata. It is a settled geological fact that the coarser material of all our sedimentary formations thicken toward the east. This is visible in the vast thickening of the great Conglomerates, and of some other strata, and presumably of all, in that direction. Hence the Coosa field lying on the east side of our coal area, must have originally had thicker measures than either of the other coal fields of Alabama. Much of this has been subseqnently lost by denudation, but it is all retained where upper Conglomerate, or quartzitic group remains, for this, as far as we know, was the upper, or newest member of our Carboniferous formation.

Coal Seams.

In the Yellow Leaf Basin the discoveries of coal have not been numerous; this is accounted for by the fact that the out-crops of the seams are all heavily covered by a deep sub-soil, and do not show on the surface, hence the discovery of every seam yet found has been due to accident; also to the further fact, that as yet very little prospecting for coal has yet been done in this region.

Near the southeast foot of *Double Mountain*, in the N. E. ¼ of the N. E. ¼ of S. 15, T. 20, R. 2 West, a thin seam of coal eighteen inches thick is reported by Mr. Friel, as having been discovered by him, and is hence called the *Friel seam*. It was not examined and is given therefore merely as reported. In the space between Wolf Ridge and Straight Ridge it is thought that a seam of coal exists, but no out-cropping of it could be seen, and if one is there it has not been discovered.

On *Straight Ridge*, near the west side of S. 14, T. 20, R. 2 W., a seam had been partly opened in two places, but in neither, cut in far enough to get to solid coal; its thickness and quality are therefore unknown. The seam had also been a little exposed at a branch 200 yards farther to the southwest. Four miles to the northeast also on *Straight Ridge*, in S. 33, T. 19, of R. 1 West, the same seam, had been bored through, supposed there to be two feet thick, but no other tests have as yet been made on it. It appears to be a very persistent seam, and from its first discovery by Mr. Minor, it has been known as the *Minor Seam.*

In the same Section 14, given above, and also on the lands of Mr. Minor, he reports having struck another seam of coal about 100 yards southeast of the Minor seam; a little coal, probably of the same seam, was seen along the same strike half a mile farther northeast. It was judged to be the same seam, and probably thin. It was also judged that the same seam gave evidence of being near the surface in a branch emptying into Yellow Leaf Creek, in the N. E. ¼ of N. E. ¼ of S. 34, T. 19, of R. 1. W.

Another seam had been dug into and partially exposed in the same section a little farther to the east on the south side of Yellow Leaf Creek. Two and a half feet of soft coal was seen in the shale, but as yet the seam had no roofing slates or cap rock. It was judged that the seam would be increased very materially in size when the solid coal was reached. The opening gave good promise of a valuable seam. This opening is said to be in the N. W. ¼ of the N. E. ¼ of S. 34, T. 19, of R. 1 West. As no name was given for the seam, it seemed appropriate to call it the *Yellow Leaf Seam*, as it is the only one opened near that creek, and lies near it at its eastern bend in said section. No other opening has been made on this seam, yet indications of it were seen in the west side of said section, and probably some other places in Sections 13 and 14 of T. 20, Range 2 West; but as there are several seams near this horizon it could not be identified with certainty.

The Martin Seam.—Near the post office of Coalville, in the N. E. ¼ of the N. W. ¼ of S. 4, T. 20, R. 1 West, a bed of coal was discovered some years ago by Mr. E.

S. Martin, and hence called the *Martin Seam.* The soil having been washed away from a part of his field lying near the northeast corner of this tract, exposed a broad belt of black clay, which being dug into proved to be the out-crop of a very large seam of coal, eight feet broad at the surface. A slope nearly ten feet wide has been sunk on it, following down on the under clay about twenty-five feet, and nearly twenty feet deep at the end.

At the surface the dip of the seam is southeast forty-five degrees—at the bottom of the slope it is thirty-eight degrees, showing a curve of seven degrees in twenty feet, or about one degree in three feet.

The sides of the slope have been cut smooth and perpendicular, giving a good view of the seam, and a face for accurate measurement of its thickness. It has no partings or seams, no joints or cleavage planes, but from top to bottom is one homogeneous mass of solid coal. It was measured in the presence of a number of people, by one man with a tape line mounting a ladder to the top of the coal, while another drew the line tight to the bottom, at a right angle, or perpendicular to the dip of the coal as determined by the square; this measure accurately taken showed the coal to be *twelve feet and ten inches thick.*

From the out-crop the seam has thickened nearly five feet in twenty, or an average of three inches to the foot, and is still increasing. But it has not yet been cut into far enough to show the full size of the seam, or to give an average sample of its coal; it shows as yet no roofing slates, and only the edge of a rock, which may be its cap rock, is seen about two feet above the seam. That it will improve in size, and quality, till it is found beyond the influence of subterraneous decay, is very certain. Apparently it must be cut in eight or ten feet farther to reach this condition, and be under the protection of roofing slates and a solid cap rock. Should the coal continue to thicken as it has done, or as it may be rea-

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sonably expected to do, for that distance, it will approximate fifteen feet when fully developed.

This is already the largest coal seam yet found in Alabama. The *Mammoth Seam* of the *Henryellen Basin* in the Cahaba Coal Field, has hitherto merited that distinction, and with the exception of some pockets and squeezes, was considered the largest seam of bituminous coal in the Appalachian Coal Field. As measured and figured by Mr. Squire in his Reports on the Cahaba Coal Field, the *Mammoth Seam* carries eleven feet seven inches of coal in two main benches, but has five partings, aggregating 13½ inches of slate and foreign matter. The *Martin Seam* already carries 12 feet 10 inches of coal in one solid body, or fifteen inches more coal than the Mammoth—in other words, its solid coal without a parting, is thicker than the Mammoth seam, with all its partings included.

The Martin opening shows the following

SECTION.

Clay, and soft pink colored shales...	2 ft.
Thin soft reddish sandstones........	2 "
Yellowish gray sand rock and clay....	2 "
Coal, solid, massive,.........	12 ft. 10 in.
Underclay, dark, thick.	

This opening is on nearly level ground, slightly descending toward the southeast with the dip of the strata, hence the small amount of roofing material and earth yet above the coal in this opening.

That the quality of this coal will be of high grade appears most probable. A copy of an analysis of it made at Blocton, when it was first opened up, is at hand, and shows the following

Analysis.

Moisture	1.43
Volatile Matter	32.21
Fixed Carbon	60.85
Sulphur	1.10
Ash	4.41
	100.00
Ash in Coke	7.00

From an inspection of the opening it is not believed that the above was made from an *average sample* of the coal. It shows qualities superior to the present average, though probably not superior to what the average will be when the seam is fully developed.

It was much desired to get a sample that would fairly represent the seam in its present conditions; but on account of water in the slope this could not be obtained from the face of the seam. Only samples from coal long exposed to the weather on the dump could be had. A sample of this analyzed by *Dr. J. M. Pickel,* Professor of Chemistry in the University of Alabama is here inserted.

Analysis.

Moisture	0.76%
Coke	63.61 "
Volatile Matter	35.63 "
	100.00
Ash	14.93
Sulphur	3.33

This sample held too much ash and sulphur, and was probably as far below an average of the seam as the Blocton sample appeared to be above it. For the present it can be very positively said, it is a very free burning coal that cokes easily, and gives satisfaction in the blacksmith forge.*

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*It is probable that this analysis represents the composition of the bony parts of the seam only, the purer parts on the dump having crumbled down on exposure.—E. A.S.

To many who have never seen this immense seam of coal, it might appear reasonable to infer, that such abnormal thickness of coal could only result from abnormal causes, and the suggestion of "pocket," "squeeze," "slide," "fold, or duplication of seam," might be very probably entertained. To all such it is proper to state, that neither the immediate surroundings, nor anything in the vicinity of this opening, give any evidence of local disturbance. For a wide space on each side, and far to the southeast, and south, the surface of the country is gently undulating; showing neither faults, breaks, nor uplifts to mar the continuity of the regularly diminishing southeast dip of the strata.

This seam was traced northeast from the Martin opening, by its trend and associated strata, and several places were found where its out-crop evidently came near the surface; but no effort was made to expose it in any place except on the lands ot Mr. Wilder, in the S. E. ¼ of the S. E. ¼ of S, 24, T. 19, of Range 1 West, four and one-quarter miles northeast from the Martin opening. A place was there found with the surface soil all washed off, and exposing a broad belt of black clay from four to six feet broad. This clay was dug into far enough to show that it was wholly formed of *decomposed coal,* and that the whole breadth of it had not been exposed by the wash. The evidence was satisfactory, and conclusive, that it is the Martin seam, and apparently undiminished in volume.

Efforts were also made to locate, and open this seam, about five miles southwest of the Martin opening, in sections 13 and 14 of T. 20, R. 2 West, where hands and tools could be obtained to do the work. Other seams were found and identified, and from them in connection with other *indicia,* it was believed the out-crops of the big seam were finally located. But the supposed out-crops were in places where on account of water, or the amount of excavation required, it would have cost more to expose the seam than the survey could devote to the work. It is believed however that private parties will follow up the indications pointed out, and show up this seam in that locality at an early period.

Much interest has been taken in the *Martin seam*, not only on account of its vast size, and great prospective value, but also on account of its geological relations. It is associated with, and included between bands of soft pink colored sandstones, and reddish colored spotted sandstones, the latter filled with spots of white, blue, and gray, aluminous matter of the size of small peas, but not uniformly round. Similar rocks have been found in many places in the Coosa Coal Field, and in some of them this formation, called *loam Sandstone*, is so prominent as to make the country; but only in the Yellow Leaf basin has it been found associated with coal. This formation is very prominent from the C. and W. R. R. northeast to Kelley's Creek, but with one or two exceptions it lies below all the productive coal seams. It is the same in the Coal City, and Fairview districts; in the latter it makes a belt of country about a mile broad, which as yet is not known to hold any coal. In the Ragland basin the spotted rocks make the great bluffs of the Coosa River about Lock No. 2 where no evidence of coal is seen. While the Yellow Leaf region, this formation occupies the middle of the Coal Measures, and environs the most productive seams. Why this great difference in the structure, and arragement of different parts of this field should exist, or by the operation of what causes produced, are questions of much interest, but as yet we have no data sufficient for their explanation.*

Again, it is as yet impossible to correlate the Martin seam with any other known seam of coal. The Cunningham seam, on the other side of Double Mountain, makes to it the closest approximation, in quality, and structure of coal. Yet it is not half as thick, and the surroundings are very dissimilar. It is not environed with soft pink or loam sandstone, but with hard gray rock instead;* it is also associated with another seam of coal fifteen or twenty feet below it, making all its surroundings very different from the Martin seam. But rocks, and arrangement of strata may vary from place to place, and the Cunningham, and Martin seam may be the same. Yet were this established, it would only extend the area of the seam over what was probably once a continuous basin, without accounting for its peculiar surroundings, or advancing one step towards its correlation with any other seam beyond that area in this, or any other field.

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*A probable explanation would be that a rock with the characters above enumerated occurs at more than one horizon in the Measures. E. A. S.

This matter must be left for future exploration and study, with the brief remark, that so far as yet seen, it appears to be a local seam, formed under localized conditions.

Other Seams.—On the southeast side of the Martin seam the first one that is known was bored through with an auger, the usual way of prospecting in this region, in the S. W. ¼ of the S. E. ¼ of S. 24, T. 19, R. 1 W., about 500 or 600 feet to the southeast of the out-crop of the Martin coal seam. It is reported as three feet thick, but of course that measure included the slant or dip of the seam, for which allowance must be made. It has not been exposed by digging and hence its dimensions, or quality of its coal, can not be given. The surface rocks at, and near the place, gave evidence of coal, and if the reported slant thickness is correctly given, it may be considered a good prospect for coal. In this region where there has been so much sub-aerial decay, coal seams, unless of very large size, make but a small showing near the surface.

The same seam, or more probably one lying still farther to the southeast, was partially exposed in the N. W. ¼ of the S. W. ¼ of S. 13, T. 20 of R. 2 West. In a deep gulley washed out in an old field, about three feet below the surface, a little decomposed coal was exposed.

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*This difference may be in part at least, due to diffierences in the degree of decomposition or decay of the rocks —E. A. S.

This was dug down into about two feet, and showed coal fifteen inchces thick and increasing, with good under clay, but as yet no roofing slates—covering, soft gray shale—dip eight degrees to southeast.

About a hundred yards to the northwest of the last opening, very plain signs of a coal seam were observed where a branch crossed its strike, but its exact position could not be assertained on dry ground, and hence it was not opened. The centre of the synclinal lies about three quarters of a mile to the southeast of this locality, and it is about half a mile in the same direction to the base of the quartzitic group. The surface shows mainly clay, slate, and soft shale dipping very gently to the southeast. In this belt coal is confidently expected to exist. In other regions, and other parts of this field; good seems of coal have always been found below, and in connection with, the quartzitic group; no reason is apparent why the same conditions should not be found here.

About a quarter of mile southeast of the centre of the synclinal, very plain signs of an out-cropping coal seam were seen, and traced for several hundred yards, but the corresponding out-crops on the northwest side of the synclinal were not found, though their indicated place was just about the horizon where a good sub-quartzitic coal seam probably exists.

This belt of country adjoining the quartzitic group was confidently expected to prove the most productive part of the basin; and yet while the other parts of the field have *seven* known seams, not one as yet been discovered here. While the general appearence of this belt is suggestive of productive coal strata, yet with the rapidly diminishing dip, the chances of noting the out-crops of seams are greatly diminished. Then the gentle and smooth undulations of the surface, and the want of relief, and exposures of the edge of strata, even in the hills, aids greatly in concealing the under ground structure, and mineral contents.

That good seams of coal exist in this upper belt, a mile and a half broad, of the newest and usually the most productive measures, is a natural and reasonable inference, yet none are known to the public. This is also the case in the whole of the southeastern side of the synclinal, comprising with the newer measures in the centre, a belt of country nearly three miles broad, and in which it is certain that all the seams on the northwest side of the synclinal must neccessarily come near the surface; yet in all this space not a single out-crop of a coal seam of any value is known to exist.

This surprising and seemingly anomalous fact is the result of two causes: *first* the depth of decomposed material that covers the out-crops, or edges of the coal seams in this region, renders prospecting for coal laborious, expensive and uncertain. Hence it has not been generally attempted, except by experts, and practical prospectors, who were employed by, and working solely in the interest of, companies, speculators and corporations. By the labors of these parties much of the country has been explored, and dug, and bored, and trenched over. Some honestly professing to search for coal, while others whose honesty might be questioned, professed to "hunt for *gold*." Yet so far as the public knows, both were equally unsuccessful. In barren ground their excavations were left open, while in many places they were very carefully covered up. If any discoveries of coal were made by all this labor, and this was unavoidable, they were very carefully withheld from the knowledge of the public, and treasured up for the sole benefit of the parties for whom the work was done.

From the above stated facts the *second* reason for the backwardness of the coal development in this region has naturally resulted. Many parties have been induced to sell their mineral rights, often for a very inadequate consideration, while those who have not yet sold them, have been often told that they have nothing of value to look for. Hence one class of citizens have no interest in the coal development, and would rather prefer that it should not be made, lest their remaining interests should be thereby impaired; while the other fear to make efforts for this purpose, which they have been taught to believe would not be remunerative. Thus all private efforts to search for coal in this section of the country, have been effectually checked and abandoned. To this must be added the further fact that large portions of the lands in this region belong to companies and corporations, who, whatever they may know or believe of their intrinsic or prospective value, are not now moving for their development.

Such were the conditions that confronted the efforts of the Geological Survey to study and disclose the mineral wealth of this large, and important coal basin, conditions which could not be overcome without the expenditure of more money than could be devoted to the work from its limited appropriation. Enough however has been shown of its mineral wealth, to emphasize the fact that this is a region of great prospective and commercial value, and one of the important factors in the great future of Alabama, and which, for the development of its exhaustless mines, requires only the means of transportation to carry its wealth to expectant markets.

It may be proper to add that a branch rail road can be built to any part of this basin, either from the Columbus and Western Railrtad, or from the Louisville and Nashville.

A trial survey from the latter road, starting at Bragg's Tank, south of Siluria, has already been made into this region, which showed that the route was entirely practicable, and that a branch road from that point, ten or twelve miles long, would reach the heart of this coal and lumber region. And as mining and transportation are co-ordinate factors in the process of development, and would be here largely interdependent for their success, we may be sure that a branch from one, or the other of these railroads, will be built into this region whenever there is assurance given of sufficient business to justify its construction.

CONCLUSION.

It seems proper in conclusion to recount, and review the promihent features of structure, and of the industrial status, of the Coosa Coal Field, as disclosed and ascertained in the progress of its survey. It is a long narrow belt of Coal Measures bordered on each side by great uplifts of older strata, and generally folded relatively downwards by their combined pressure into a deep synclinal. Its different parts are deformed, and modified, by the relative force of these marginal uplifts, which have also reduced its surface measure to less than half of its original breadth.

It is further deformed by internal faults, running generally at acute angles, presumably from one of the great boundary faults to the other. In consequence of these faults combined with pressure, much of its surface is plicated into ridges and mountains, at present much higher than the bordering valleys; yet originally these great valley uplifts must have been much higher still. The original altitude of these valley uplifts, probably attained by progressive elevations, can be approximately shown by extending the angle of dip of the base rocks of the Coal Measures, and others, upward and outward into space.*

One result of the original great elevation of the bordering valleys, was the proportional sinking or downward folding of the Coal Measures, far below their normal position, and thus affording them protection from surface denudation. Hence, while the great valley uplifts have been washed away, the included coal area has been largely preserved.

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*Degradation by erosion probably went on with nearly equal pace with the uplifting, so that the actual elevation above the surrounding areas may never have been much if any greater than it is now.—E. A. S.

Another result of the compressing force of the valley uplifts is also apparent; where these forces were approximately equal, the Coal Measures were forced into a trough, or true synclinal near the centre of the field, but where they were greatly unequal, a partial monocline, or basin with axis toward one side of the field, with including cross fractures, was produced.

In the examination of this field, its general structure has been satisfactorily ascertained; and a great increase has been made in our knowledge of its coal seams, and of its coal-producing capacity. Yet much remains to be done to give practical completeness to the investigation. It is an undoubted inference from the structure that many coal seams are yet undiscovered, and many that are known are wholly undeveloped. In some of the basins the under-ground structure is so completely hidden, that only deep boring can reveal their contents. This would involve expense beyond the means at the disposal of the survey; and yet it is reasonably certain that the outlay of a few hundred dollars by the State in this work, would in future years very greatly increase the public revenues.

The Geological Survey is, at this time, the only agency at work for the development of this coal field. This condition of apparent public and private apathy requires a brief explanation. During the boom times in Alabama, most of the coal lands in the Coosa field, of known or reputed value, were bought up by coal mining, and coal speculating companies. Money was borrowed to extend their operations, and the lands placed as collateral. With the subsidence of the boom the companies failed to meet their obligations and their collateral—the coal lands—went into the hands of their creditors. There they still remain, as dead or unproductive capital, except the mines at Ragland and Coal City, which are operated under lease. With these two exceptions, all mining by private parties, or companies has ceased in this field, with no present prospect of resumption. The parties who own the property, mostly non-residents of the State, are not in the coal mining or development business, and are not expected to make improvements. New companies will not pay for undeveloped coal lands, the prices for which they were hypothecated; the owners are not compelled to sell, and will not take less than cost. Such are the unfavorable conditions which becloud the future mining prospects of large portions of the Coosa Coal Field, especially near the line of the E. & W. R. R. of Ala., and on part of the line of the Georgia Pacific also. It is in consideration of these facts that the statement is so confidently made, that a moderate amount of money expended by the State in showing up the value of some of these coal lands, would re-awaken public interest, augment values, establish business, and largely increase the wealth of the country, and the public revenues in the near future.

Characteristics of the Coosa Coals.

While different seams of coal show special differences in the structure and composition, in this, as in all other coal fields; yet there are general features of similarity that distinguish these coals, as a *class*, from other coals ——. They are highly bituminous—free burning, yet rich in fixed carbon. Soft, easy to mine, free from bone or slaty structure, and also from combined sulphur or *pyrite*—generally called sulphur flakes, and often and fervently maledicted by the miners in other fields.

They long sustain combustion, and leave but little ash or cinder, and no clinker, and are hence well adapted for raising steam, for forge work, and for all other purposes of fuel.

But their softness and liability to break and crumble, impair their shipping qualities. They will not bear transportation as well as the harder and heavier coals of the Warrior field, or even some of the Cahaba coals. In mining there is much fine coal produced, which, unless made into coke, is a material waste; and in the run of the mines there is a less proportion of salable lump and nut coal in the out-put, than among the harder and more impure coals.

The most important characteristic of these coals is in their *superior coking qualities*. They will rank among the first class of coking coals. This is not a very extensive class. Though coke can be made from most of the coals in the Appalachian field, which is distinguished as a field of coking coal, and which produces over ninety-five per cent of all the coke made in the United States; yet all this coke that is of commercial value, is made from a very few seams, lying "generally near the eastern limits of the field." For it is a recognized fact, and so stated by the highest authority, that "the coal in the middle or western part of the field is, as a rule, not so well adapted to coking as that of the eastern." This is the case all through Pennsylvania, and West Virginia, and doubtless in the other parts of the field also. Hence, the good coking qualities of the Coosa coals, lying as they do, on the very eastern limits of the field, would be inferred from their position, had they never been tested. But ample tests have been made to demonstrate the fact that these coals are among the best of our coking coals.

It was at the Inman mines, in the Fairview District, that coke was successfully made in commercial quantities on the open ground, without ovens; a fact so often referred to in statistics of the coking industry. The process was to pile the coal around small cones, built about two feet high of loose rocks, and fire from the centre. These cones with the rocks all vitrified, and welded together yet stand as monuments of this unique, though successful process.

The excellence of the Coosa coal and coke has been shown in this report, and it is hoped that their production may be very greatly increased in the future; the commercial interests of the State, and the metallurgical prosperity of the adjacent valleys demand, that vigorous and persistent efforts be made to promote this result.

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